A Preliminary Classification of the Rocky Mountain Shrubland Communities of Alberta

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September 2000

Prepared for
Alberta Environment
Alberta Natural Heritage Information Centre

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101-03736/

Acknowledgements

I would like to thank Lorna Allen for help with the project and for comments on the report and analyses. Thanks also to Keith Ainsley who provided valuable information about the ESIS database. Finally, I am grateful to Agnes Wong and David Beilman for advice and discussions about the classifications and maps.

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Introduction

The Alberta Natural Heritage Information Centre (ANHIC) collects, analyses and disseminates information on the natural biodiversity of Alberta. One of the elements of diversity which ANHIC monitors are plant community types. Plant communities of special conservation concern are placed on tracking and watch lists which are being developed for the province (Allen 2000). Much of the vegetation of Alberta is still poorly understood, and ANHIC has identified several high priority vegetation groups that require further study and classification. One such high priority group is the shrubland communities of the Rocky Mountain Natural Region.

The objective of this report was to develop a better understanding of the shrubland community types of the Rocky Mountain Natural Region through the numerical classification of existing plot data.

Methods

This study used a quantitative approach to the classification of Rocky Mountain shrubland communities. The classification system used was based on comparing species abundances within study plot, with plots placed into groups based on their similarity in species composition. The groups identified in this report correspond to the "association" level of classification used in the U.S. National Vegetation Classification System (Grossman et al. 1998). Previous work on Alberta's Rocky Mountain vegetation has often focused primarily on community types other than shrublands, sampled only a limited area, or described vegetation at a level of organization higher than the fine-scale associations which are useful for identifying rare plant community types (Archibald et al. 1996, Beckingham et al. 1996, Corns and Achuff 1982, Willoughby et al. 1997, Willoughby 1999, Timoney 1999).

Data preparation

Raw data for this analysis were obtained from the Alberta Ecological Site Inventory System (ESIS), a database of vegetation survey plots collected from numerous sources. All analyses were performed on data from the ESIS database version "DMR #005S13, NAD27 ASCII data, Extracted May 11, 2000". The ESIS database is a collection of data from a large number of sample locations in Alberta. Each sample location is referred to as a plot, with each plot having a unique identifier ("Other Plot #") that can be used to combine species, environmental and location data from different files for that particular plot. All data files from the ESIS database were imported into a Microsoft Access database (*ESIS.mdb*) as tables, and linked together using the "Other Plot #" field.

The first stage of the data preparation was to extract a list of plots which were located in the Rocky Mountain Natural Region and could be defined as shrublands. Plant species covers were obtained from the *exss.txt* data file, while the natural subregion each plot occurred in was obtained from the *exloc.txt* data file. We defined a shrubland plot as any plot in which total shrub cover was greater than 10% and total tree cover less than 25%. This definition allowed the inclusion of plots which might contain less than 25% shrub cover, but in which shrubs were still

the dominant species, as per the Nature Conservancy's definition of a shrubland (Grossman et al. 1998).

The ESIS database includes a summary of the total cover for different plant strata in each plot in the file *exveg.txt*. For trees and shrubs, these strata (e.g. "S1 – Tall Shrubs" or "T1 – Main Canopy Trees") are defined by plant height, not growth form. For example, the ESIS stratum "S1 – Tall Shrubs" may include shrub species, as well as trees between 2.5 and 5 meters in height (Alberta Environmental Protection 1994). Since this classification required that plots be classified by cover of shrub species, not by cover of both trees and shrubs below a certain height, a summary file (*EXSS_AllRecords_Strata.xls*) was generated which listed the total cover of tree and shrub species in each plot as defined by the Alberta Master Plant Species List (Alberta Environmental Protection 1993). Total cover of tree species in each plot was calculated from the species covers listed in *exss.txt*, and these total tree cover values were subtracted from the total cover of all tree/shrub strata (T1, T2, S1, S2) to obtain the corrected total shrub cover in each plot. This list was then queried to include only plots which occurred in the alpine, subalpine or montane subregions in which shrub cover was greater than 10% and tree cover less than 25%, creating a master list of 1363 Rocky Mountain Shrubland plots (*Group_ID.xls*) which was used for all subsequent analyses.

Exploratory analysis of the data indicated that the montane subregion was very different from the subalpine and alpine subregions in terms of environmental and species characteristics, so the montane plots were analyzed separately from the subalpine and alpine plots. The total number of plots used in the analysis was 1363, of which 1228 were subalpine and alpine, and 135 were montane.

Ordination and classification

The initial analysis of the data involved performing ordinations on the Rocky Mountain shrubland plots to better understand the structure of the data, and the relationships between species and environmental variables. This required that the data be formatted in spreadsheet format for use by the analysis software PC-ORD (McCune and Mefford 1997).

Since most spreadsheets cannot work with more than 255 columns of data, and since most ordination methods require the number of sites to be greater than the number of species being analyzed (Legendre and Legendre 1999), ordination/classification output files were limited to include 255 species or less. This was achieved by only including species which occurred a given number of times in the data set. For the montane data, there were a total of 135 plots which contained 648 different species. The output data files used in the montane ordination contained only those species which occurred in at least 10 plots, leaving 100 species in the output data file *mon-sp10.wk1*. For the alpine/subalpine data , there were a total of 1228 data plots containing 1237 species. The output file *as-spp33.wk1* used in the alpine/subalpine ordination contained only those species occurring in at least 33 plots, leaving 254 species in the analysis.

A possible consequence of only including species which occur a minimum number of times in the data is that the ordinations and classifications could overlook plant communities dominated by rare species which were omitted from the data set. However, the majority of the species omitted from the analysis data sets occurred in very few plots, and they tended to have very low cover when they did occur. In any case, these species would show up in the summaries which were prepared for each group, since the group descriptions were based on a query of the

complete species data set (*exss.txt)* for all plots in each group, not the data sets with species omitted.

Using information from the *exloc.txt* and *exsias.txt* files, I prepared output files (*mon-env.wk1* and *as-env.wk1*) which contained the environmental data associated with each plot included in the analysis. The environmental variables used in the analysis included aspect, slope, drainage, ecological moisture regime, natural subregion and nutrient status. These six variables were selected because most of the Rocky Mountain Shrubland plots had values listed for them; many of the other variables in the ESIS database were only listed for a small proportion of the plots. The location of each plot was also included (as UTM coordinate or latitude/longitude) when it was supplied in the ESIS database, although many of the plots did not have a precise location listed.

Ordinations of the two data sets were performed to allow a qualitative evaluation of the species and environmental associations found in the data. Using PC-ORD, I performed Detrended Correspondence Analysis (DCA) on the data. Although numerous ordination methods exist (Legendre and Legendre 1999), DCA was chosen because it produced easily interpretable ordinations that illustrated the trends in the data well.

In order to classify the plots into community types, hierarchical agglomerative clustering algorithms were used to define groups based on their similarity in species composition. There are a large number of methods available to cluster biological data, but after a literature review and a test of several different methods, I chose to use the Sorensen distance metric and farthest neighbour clustering algorithm (Legendre and Legendre 1999) as the classification methods for this study. These methods are useful when classifying biological communities, since they tend to produce well-defined, distinct clusters, which is desirable when trying to define homogenous species assemblages. Classifications were performed separately on the montane and alpine/subalpine input files (*mon-sp10.wk1* and *as-spp33.wk1*) using PC-ORD software (McCune and Mefford 1997).

After the data had been classified, it was necessary to determine a number of groups to recognize. The classification itself merely ranks the plots in terms of their similarity to each other; it is up to the analyst to decide what cutoff level of similarity will be used to define a group. The choice of the number of groups to recognize once the plots had been classified is a difficult and somewhat arbitrary decision. A small number of groups can be easier to interpret, but the groups will tend to be larger in size, and heterogenous in terms of their species composition. Groups of large size may include several rare community types, so when searching for rare communities a higher number of smaller groups is desirable. However, a very large number of groups is difficult to interpret due to the sheer number of different community types which must be summarized and compared, and in some cases differences between the classification algorithm's groups may not be biologically significant, being merely due to a single species being present or absent, with the same species dominant in both groups.

The choice of the number of groups to use in this classification was made based on examination of the data and experimenting with different numbers of groups, keeping in mind the objective of recognizing rare community types and providing a usable classification scheme. The final decision was to recognize 30 groups in the montane data, and 80 groups in the alpine/subalpine data, which gave fairly homogenous community types which correspond to The Nature Conservancy's "association" level of community organization (Grossman et al. 1998). Several of these groups were later manually combined or eliminated from the analysis.

Once each plot had been assigned to a group, the species list *exss.txt* was queried to

create a list of all species occurring in each group (*mon_group_spp_summary.xls* and *as_group_spp_summary.xls*). Groups were summarized as a list of the species occurring in each group and each species' mean cover and frequency. Environmental variables were also listed for all plots in each group. This allows individual species (e.g. species on the ANHIC tracking list) to be queried to determine which groups they are associated with.

A problem associated with the definition of shrubland plots used in this analysis is that some plots which contain greater than 10 % shrubs and less than 25% trees may still end up being better classified as herbaceous, woodland or sparsely vegetated communities rather than shrublands. For example, a plot might contain 90% cover of grasses, but if it also contained 10% shrubs and no trees, it would meet the definition of a shrubland plot used in this analysis. Clearly, such a plot would be better classified as a herbaceous or grassland community, so a visual inspection of mean stratum covers for each group was used to eliminate groups which were obviously not shrublands due to their being dominated by non-shrub species. Groups were only eliminated if the cover at least one non-shrub stratum was clearly much greater than total shrub cover, and if shrub cover was near the 10% lower limit. Eliminated groups were not included in the descriptive summaries. Several borderline groups which were difficult to classify were included in the descriptive summaries, but were indicated as such in their discussion.

I also eliminated groups from the alpine/subalpine classification which were dominated by dwarf shrubs, since these communities were treated in Timoney's 1999 report on high elevation dwarf shrublands. I defined a dwarf shrubland as an alpine or subalpine community that was dominated by *Cassiope mertensiana*, *Cassiope tetragona*, *Dryas integrifolia*, *Dryas octopetala*, *Phyllodoce glanduliflora*, *Phyllodoce empetriformis*, or *Empetrum nigrum*.

After manually eliminating unsuitable groups, 29 montane and 46 alpine/subalpine groups remained, containing 134 montane and 646 alpine/subalpine plots respectively. Each group was given a group number, as well as a descriptive name containing the dominant species in that community type. I used a naming convention similar to the Nature Conservancy's standard for naming plant community associations (Grossman et al. 1998). The dominant species in each community type (those with high cover and/or frequency) were listed in the community name, with different strata separated by a "/" and species within a strata listed in order of their dominance, and separated by a "-" character. When several species of the same genus were dominant in a community type, they were usually combined and the suffix "spp" added to the genus name. The community names used in this report are more verbose than those used by the Nature Conservancy. Since these are provisional groups, descriptive but lengthy community names were chosen over shorter but less descriptive names.

For each group, a summary writeup was prepared which includes a list of the characteristic species (those with mean cover across all plots in the group $\geq$ 2%), a summary of the habitat characteristics associated with the group, and a list of the plots included in the group with their respective locations. Where appropriate, notes were included on the distribution of each group and its potential status as a shrubland community type.

Using the UTM coordinates associated with each plot in the ESIS database, a map of the geographic location of the plots was created using ArcView GIS software. Since many of the ESIS plots were missing location data, this map is incomplete, but it gives a general indication of the distribution of ESIS sample plots in the Rocky Mountain Natural Region. The location data is provided with this report as an ArcView shapefile (*plot_UTMS_shapefile* directory).

Results

Ordination Summaries

Both the montane and alpine/subalpine data sets were very heterogenous, with a large number of species and community types occurring in each subregion (Figures 1 – 4). The main environmental gradients in the montane data were nutrient regime and drainage (Figure 2, Axis 1) and a gradient of decreasing moisture availability at higher elevations (Figure 2, Axis 2). The main environmental gradient in the alpine/subalpine data was elevation (Figure 4, Axis 1). Raw data from the ordination result files can be found in Appendix 2.

Geographic Distribution of Plots

A map of plot locations for plots which had location data listed in the ESIS database (Figure 5) indicates that large portions of the Rocky Mountain Natural Region's vegetation remain poorly represented in the ESIS database. This may be a result of the data sources that are included in the ESIS database, which in the Rocky Mountain Natural Region appear to be primarily National Park surveys. The vast majority of Rocky Mountain Shrubland sample plots in the ESIS database were located in Banff and Jasper National Park, with the rest of the Natural Region very sparsely sampled. Several large protected areas such as Willmore Wilderness Park, White Goat and Siffleur Wilderness Areas, and most of the area south of Banff National Park (e.g. Kananaskis, Crowsnest Pass and Waterton National Park areas) are poorly represented in the ESIS database. The area north of Willmore Wilderness Park which is road-accessible (Grande Cache and surrounding area) has been lightly sampled.

Figure 1. Ordination diagram of species scores from Detrended Correspondence Analysis of montane shrubland plots.

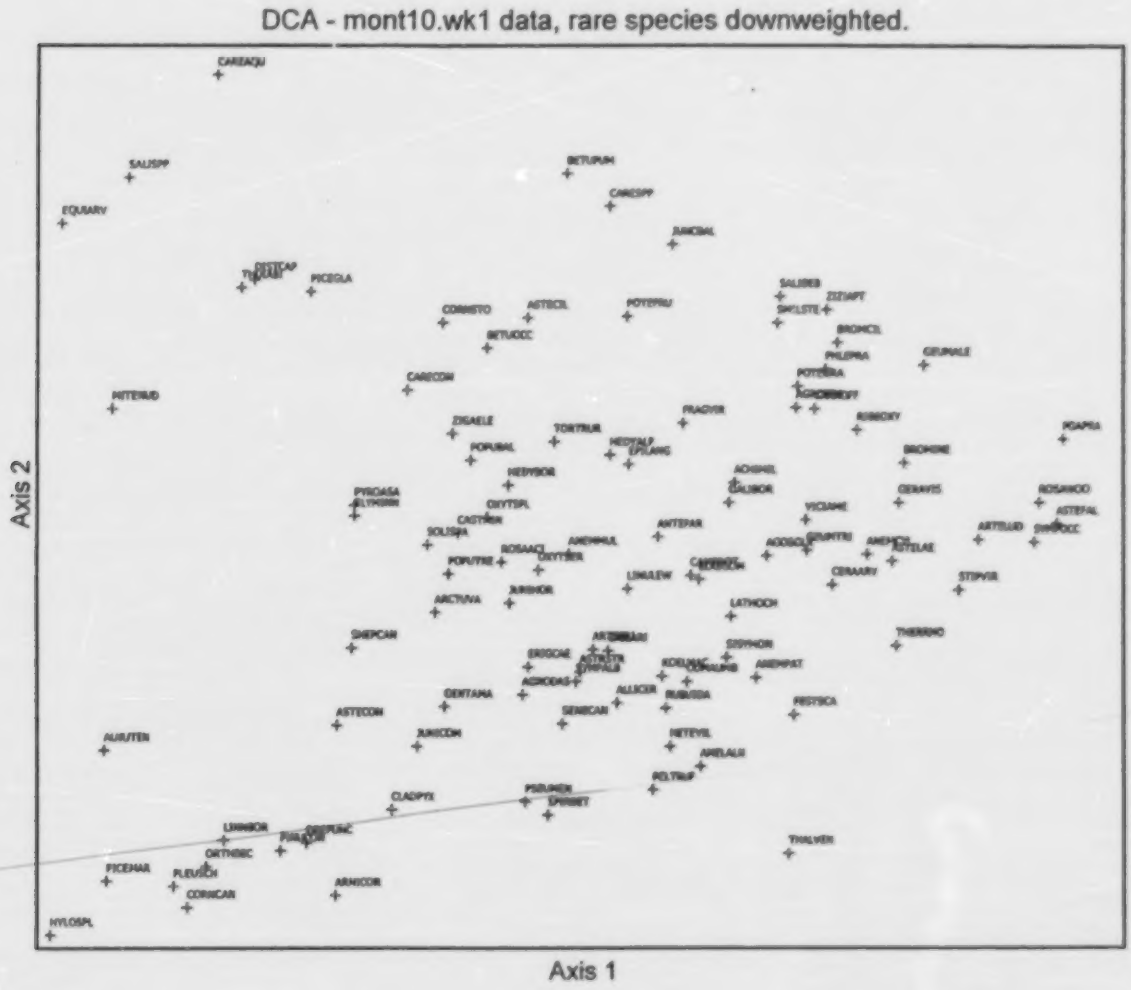


Figure 2. Ordination diagram of plot and environmental scores from Detrended Correspondence Analysis of montane shrubland plots.

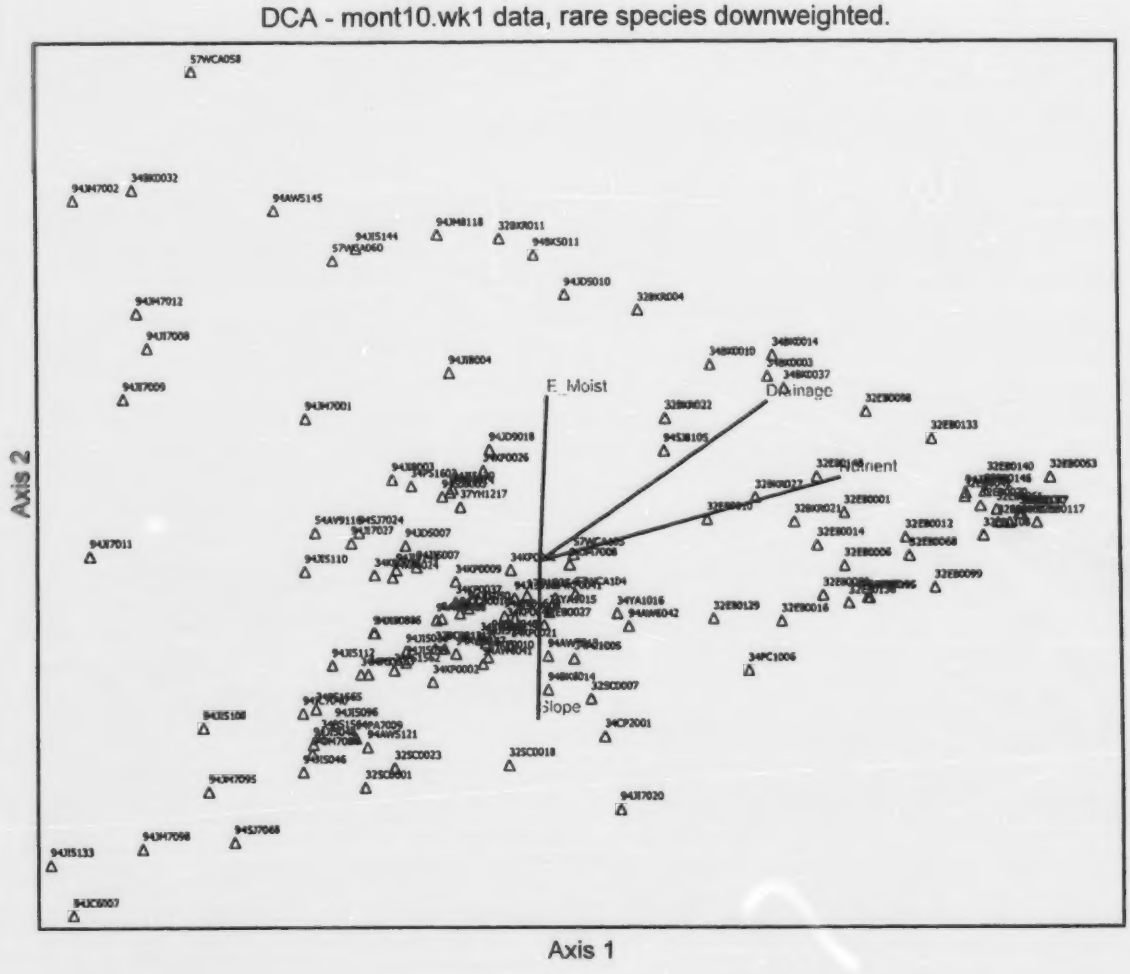


Figure 3. Ordination diagram of species scores from Detrended Correspondence Analysis of alpine/subalpine shrubland plots.

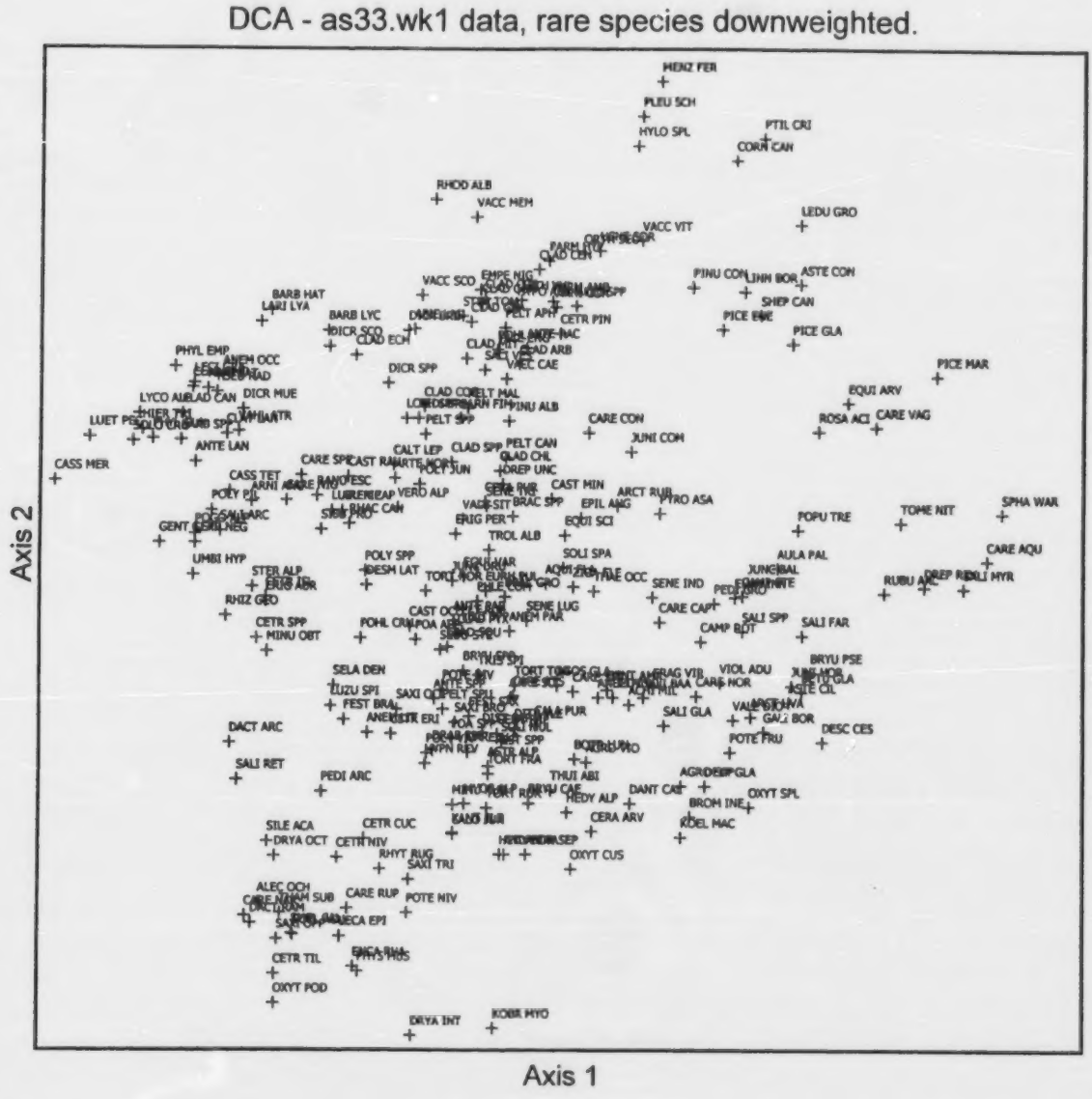


Figure 4. Ordination diagram of plot and environmental scores from Detrended Correspondence Analysis of alpine/subalpine shrubland plots.

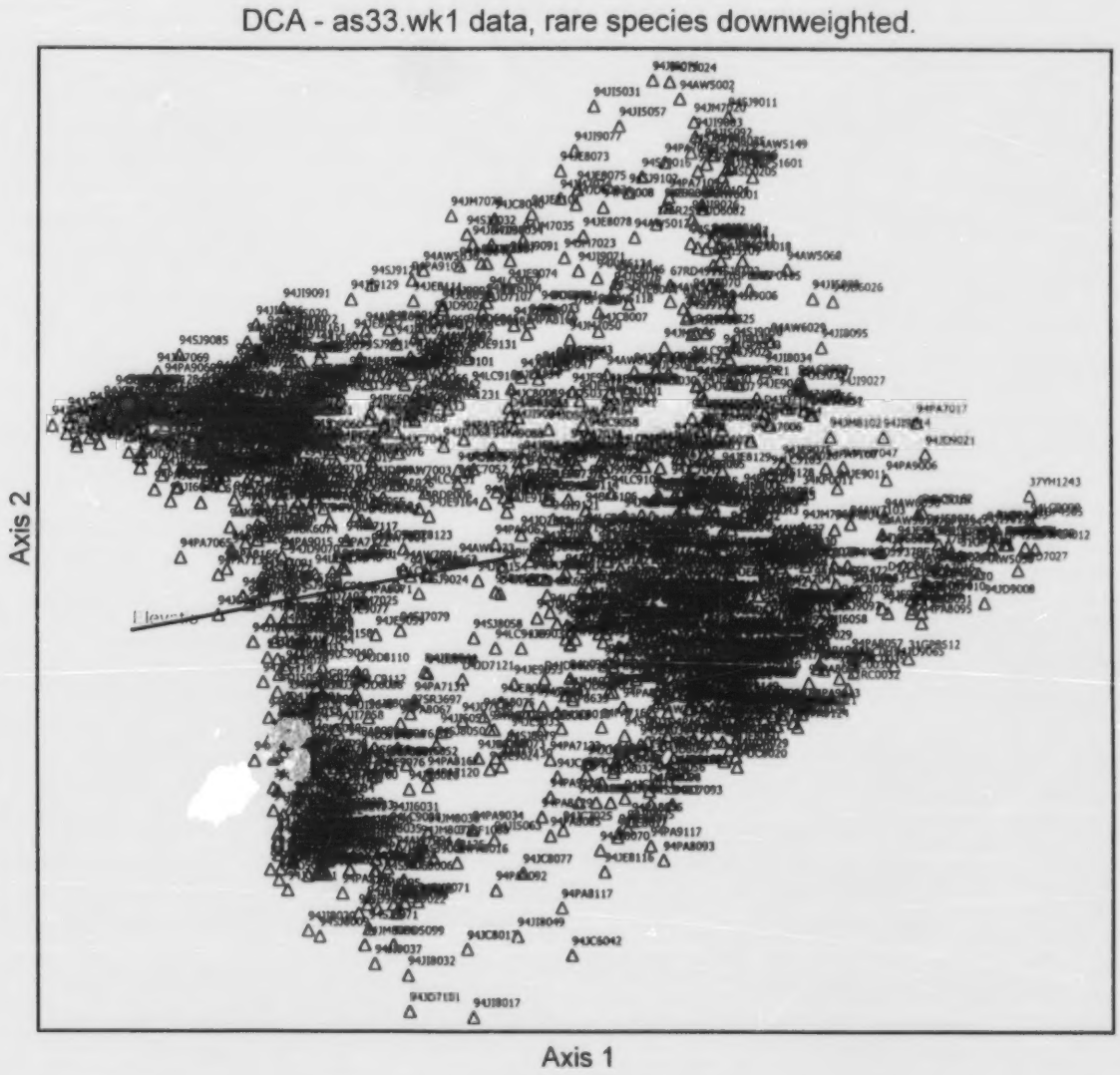
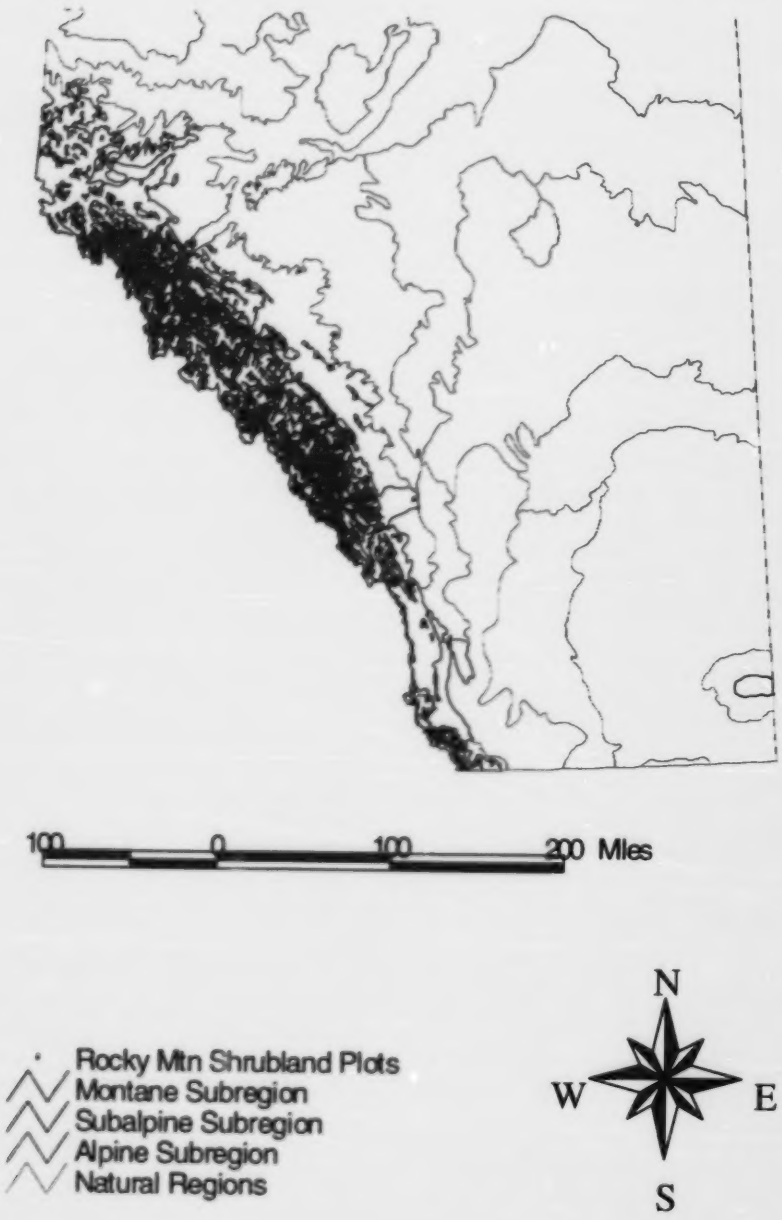


Figure 5. Map of geographic locations of Rocky Mountain shrubland plots which had location data listed in the ESIS database.



Classification Summaries

The community types recognized in each subregion are summarized in Tables 1 and 2. . For each group, the number of plots included in the group (N) is indicated, along with the mean values and standard deviation of the environmental variables for each group. The montane community types have been ranked in order of increasing moisture, while the alpine/subalpine community types have been ranked in order of increasing elevation. A complete list of all plots included in the analysis and their group numbers can be found in Appendix 1

Table 1. List of shrubland communities in the montane subregion and their associated environmental characteristics, sorted by moisture. Values are listed as group mean ± standard deviation. Units used for environmental variables are listed in Table 3.

Group	N	Group Name	Aspect	Drainage	Elevation	Moisture	Nutrient	Slope
m84	3	*Picea engelmannii / Juniperus communis – Shepherdia canadensis / Koeleria macrantha*	225.0 ± 90.0	±	1420.0 ± 190.8	2.0 ±	±	51.7 ± 18.9
m39	2	*Juniperus communis – Shepherdia canadensis* / Herb / *Stipa columbiana*	192.0 ± 17.0	2.0 ±	1512.5 ± 145.0	2.5 ± 0.7	±	41.5 ± 9.2
m13	5	*Juniperus horizontalis – Arctostaphylos uva-ursi / Agropyron dasystachyum – Calamagrostis purpurascens*	197.2 ± 67.9	2.6 ± 1.1	1269.8 ± 147.6	3.2 ± 1.5	3.0 ± 0.0	21.8 ± 30.6
m37	4	*Pinus contorta / Vaccinium caespitosum - Amelanchier alnifolia – Arctostaphylos uva-ursi - Juniperus communis / Umbilicaria deusta*	210.8 ± 20.2	2.3 ± 0.5	1624.8 ± 132.9	3.3 ± 1.3	±	36.3 ± 13.1
m63	15	*Arctostaphylos uva-ursi – Shepherdia canadensis / Elymus innovatus*	186.6 ± 71.9	2.2 ± 0.8	1338.7 ± 178.8	3.3 ± 0.8	2.3 ± 0.6	36.4 ± 27.3
m11	5	*Symphoricarpos occidentalis – Artemisia cana / Poa compressa – Stipa spp.*	209.0 ± 46.2	3.0 ± 1.6	1197.8 ± 40.0	3.4 ± 0.5	3.0 ± 0.0	26.6 ± 9.1
m76	4	*Rosa acicularis - Elaeagnus commutata – Salix scouleriana - Rubus idaeus – Lonicera dioica / Urtica spp. / Phleum pratense*	217.3 ± 85.2	3.3 ± 1.5	1155.0 ± 165.0	3.7 ± 1.2	3.0 ± 0.0	33.8 ± 32.5
m38	3	*Populus balsamifera / Elaeagnus commutata - Amelanchier alnifolia - Juniperus horizontalis / Agropyron dasystachyum*	120.5 ± 140.7	3.0 ± 0.0	1473.3 ± 175.5	4.0 ± 1.7	2.5 ± 0.7	12.7 ± 19.3
m71	2	*Dryas drummondii – Arctostaphylos uva-ursi - Elaeagnus commutata* / Herb / *Koeleria macrantha*	90.0 ±	2.0 ± 1.4	1369.5 ± 13.4	4.0 ±	3.0 ±	1.0 ±
m10	13	*Symphoricarpos occidentalis – Rosa woodsii / Poa pratensis – Bromus inermis*	119.5 ± 131.9	3.7 ± 0.9	1194.4 ± 58.8	4.2 ± 0.4	3.0 ± 0.0	10.9 ± 13.1
m56	10	*Picea glauca / Arctostaphylos uva-ursi – Potentilla fruticosa – Juniperus horizontalis / Carex scirpoidea – Koeleria macrantha*	234.3 ± 53.3	3.1 ± 1.2	1257.4 ± 222.0	4.2 ± 1.5	3.0 ± 0.7	19.4 ± 21.1
m6	8	*Potentilla fruticosa – Symphoricarpos occidentalis / Festuca scabrella – Festuca idahoensis – Bromus inermis*	152.1 ± 112.5	3.0 ± 0.8	1364.3 ± 107.2	4.3 ± 0.7	3.1 ± 0.4	15.7 ± 8.5
m49	14	*Pinus contorta – Picea glauca / Shepherdia canadensis - Arctostaphylos uva-ursi - Juniperus communis / Elymus innovatus*	192.0 ± 77.4	2.8 ± 0.7	1415.1 ± 193.2	4.4 ± 0.8	2.7 ± 0.5	16.6 ± 23.2
m16	4	*Potentilla fruticosa – Salix planifolia – Rosa woodsii / Agropyron repens – Poa pratensis – Stipa viridula*	153.3 ± 98.7	3.7 ± 1.2	1195.8 ± 32.2	4.8 ± 1.0	3.0 ± 0.0	14.3 ± 9.7
m36	1	*Crataegus douglasii / Viola canadensis - Osmorhiza depauperata – Parietaria pensylvanica*	157.5 ± 95.5	±	1366.7 ± 83.3	5.0 ± 0.0	±	21.7 ± 11.9
m104	3	*Pinus contorta / Alnus spp. - Linnaea borealis / Cornus canadensis / Elymus innovatus*	225.0 ±	±	1210.0 ±	5.0 ±	±	10.0 ±
m105	1	*Dryas drummondii – Alnus tenuifolia*	350.0 ±	3.0 ±	1241.0 ±	5.0 ±	3.0 ±	10.0 ±
m64	2	*Alnus crispa - Symphoricarpos occidentalis – Amelanchier alnifolia – Salix scouleriana* / Herbs	112.5 ± 95.5	4.0 ±	1590.0 ± 14.1	5.5 ± 0.7	3.0 ±	47.5 ± 38.9
m1	5	*Picea glauca – Populus tremuloides / Salix bebbiana – Shepherdia canadensis / Elymus innovatus*	201.0 ± 67.1	4.3 ± 1.3	1128.0 ± 140.4	6.0 ± 1.7	4.0 ± 1.4	9.2 ± 9.7
m46	2	*Salix spp. – Betula glandulosa / Equisetum arvense*	90.0 ±	3.0 ±	1268.5 ± 408.0	6.0 ± 1.4	4.0 ±	2.5 ± 3.5
m85	3	*Betula pumila – Potentilla fruticosa – Salix spp. / Carex spp. – Deschampsia cespitosa - Juncus spp. / Drepanocladus spp.*	±	±	1270.0 ± 252.4	6.0 ±	±	0.0 ±
m88	3	*Picea mariana / Ledum groenlandicum – Alnus tenuifolia / Hylocomium splendens*	0.0 ±	±	1270.0 ± 26.5	6.0 ± 1.4	±	24.0 ± 41.6
m69	7	*Picea glauca / Alnus tenuifolia – Rosa acicularis – Shepherdia canadensis / Equisetum arvense / Thuidium abietinum*	192.3 ± 106.3	3.0 ±	1019.1 ± 41.2	6.2 ± 1.5	4.0 ±	15.7 ± 31.9
m22	3	*Salix bebbiana – Salix glauca – Salix lanata / Deschampsia cespitosa – Phleum pratense – Poa pratensis*	150.0 ± 103.9	5.7 ± 0.6	1366.0 ± 152.3	6.3 ± 0.6	3.7 ± 0.6	3.3 ± 1.5
m4	4	*Salix petiolaris - Betula glandulosa – Salix candida / Deschampsia cespitosa – Juncus balticus*	184.5 ± 120.9	5.3 ± 1.0	1462.8 ± 28.5	7.0 ± 1.4	3.8 ± 0.5	1.5 ± 2.1

Group	N	Group Name	Aspect	Drainage	Elevation	Moisture	Nutrient	Slope
m2	2	*Salix myrtillifolia – Betula pumila / Carex spp.. – Juncus balticus*	310.0 ± 14.1	6.5 ± 0.7	1440.0 ± 0.0	8.0 ± 0.0	4.0 ± 0.0	5.5 ± 0.7
m92	2	*Picea mariana / Salix myrtillifolia – Ledum groenlandicum / Carex spp. / Tomenthypnum nitens*	225.0 ±	±	1230.0 ± 99.0	8.0 ±	±	0.0 ± 0.0
m74	3	*Salix arbusculoides / Equisetum fluviatile / Carex spp. / Sphagnum spp. - Tomenthypnum nitens*	45.0 ± 77.9	6.5 ± 0.7	1196.7 ± 58.6	8.5 ± 0.7	4.0 ± 0.0	0.7 ± 1.2
m128	1	*Salix planifolia* / Herb / *Poa spp. – Carex spp. / Campylium stellatum*	±	7.0 ±	990.0 ±	9.0 ±	±	0.0 ±

Table 2. List of shrubland communities in the alpine/subalpine subregions and their associated environmental characteristics, sorted by elevation. Values are listed as group mean ± standard deviation. Units used for environmental variables are listed in Table 3.

Group	N	Group name	Aspect	Drainage	Elevation	Moisture	Slope	NatSubR
as57	5	*Salix myrtillifolia / Carex aquatilis – Calamagrostis stricta / Aulacomnium palustre – Sphagnum warnstorfii*	145.0± 21.2	6.0± 0.0	1385.0± 137.0	8.0± 1.4	1.2± 1.6	8.0± 0.0
as60	4	*Salix drummondiana – Betula glandulosa – Ledum groenlandicum / Carex aquatilis / Sphagnum spp.*	150.3± 144.3	6.3± 1.0	1435.0± 127.1	7.8± 1.0	3.0± 2.4	8.0± 0.0
as1	8	*Pinus contorta / Alnus crispa – Salix scouleriana – Linnaea borealis / Festuca idahoensis*	196.5± 61.9	3.3± 0.5	1535.0± 244.1	4.4± 0.7	32.0± 16.3	8.0± 0.0
as154	4	*Dryas drummondii*	90.0± 45.0	2.5± 0.7	1542.5± 92.2	4.3± 3.2	7.5± 13.0	8.0± 0.0
as62	4	*Salix spp. – Betula glandulosa / Stipa spp. / Thuidium abietinum*	210.0± 26.0	2.8± 0.5	1555.0± 152.9	4.3± 1.2	16.3± 13.8	8.0± 0.0
as12	14	*Betula glandulosa – Salix myrtillifolia / Carex spp. / Tomenthypnum nitens – Sphagnum spp.*	202.4± 86.0	6.1± 0.8	1563.6± 282.9	7.5± 0.9	9.8± 26.0	7.9± 0.3
as5	9	*Salix spp. – Betula glandulosa / Carex aquatilis / Sphagnum warnstorfii – Tomenthypnum nitens*	252.0± 98.3	6.3± 0.7	1586.1± 229.8	7.6± 0.9	1.6± 2.1	8.0± 0.0
as4	17	*Pinus contorta / Shepherdia canadensis – Linnaea borealis / Elymus innovatus / Pleurozium schreberi*	163.9± 80.1	2.8± 0.6	1592.9± 205.1	4.9± 1.0	21.1± 18.6	8.0± 0.0
as122	22	*Betula glandulosa – Ledum groenlandicum – Salix glauca / Carex aquatilis – Scirpus cespitosus / Tomenthypnum nitens – Aulacomnium palustre*	150.8± 123.3	6.5± 0.5	1634.1± 231.5	7.8± 1.0	6.5± 5.8	7.9± 0.3
as349	5	*Ledum groenlandicum – Salix glauca / Equisetum arvense / Sphagnum fuscum – Drepanocladus revolvens*	180.0± 77.9	6.0± 0.8	1646.0± 177.1	6.5± 1.7	4.6± 2.3	7.8± 0.4
as76	10	*Salix spp. – Potentilla fruticosa – Betula glandulosa / Carex spp. / Aulacomnium palustre*	202.5± 101.6	6.0± 0.5	1677.0± 186.8	7.3± 1.4	1.3± 1.3	7.9± 0.3
as2	30	*Ledum groenlandicum – Shepherdia canadensis / Elymus innovatus / Hylocomium splendens – Pleurozium schreberi*	162.9± 129.6	3.3± 0.8	1708.5± 609.3	5.0± 0.8	24.0± 23.0	7.9± 0.3
as275	2	*Betula pumila – Vaccinium caespitosum / Fragaria virginiana / Poa alpina*	45.0±	±	1730.0± 99.0	5.5± 0.7	2.5± 3.5	8.0± 0.0
as73	13	*Pinus contorta – Picea engelmannii / Menziesia ferruginea – Shepherdia canadensis / Elymus innovatus / Pleurozium schreberi – Hylocomium splendens*	210.0± 130.6	3.6± 0.9	1763.1± 194.5	5.2± 0.4	21.1± 13.3	7.8± 0.4
as479	2	*Salix spp. / Fragaria virginiana – Penstemon procerus / Agropyron violaceum*	225.0± 127.3	3.0± 0.0	1765.0± 530.3	5.5± 0.7	3.5± 0.7	7.5± 0.7
as9	15	*Salix barrattiana – Salix glauca – Betula glandulosa / Carex aquatilis / Aulacomnium palustre – Tomenthypnum nitens*	123.9± 101.7	6.3± 0.5	1782.7± 302.9	7.7± 1.1	2.9± 2.5	7.8± 0.4
as422	6	*Potentilla fruticosa – Arctostaphylos uva-ursi / Elymus innovatus – Koeleria macrantha*	187.5± 44.2	2.7± 0.5	1795.0± 320.4	4.3± 1.0	62.2± 9.9	7.8± 0.4

Group	N	Group name	Aspect	Drainage	Elevation	Moisture	Slope	NatSubR
as944	6	*Salix glauca / Valeriana sitchensis / Deschampsia cespitosa – Carex aquatilis / Aulacomnium palustre*	72.0± 60.4	5.4± 0.9	1798.3± 87.5	6.0± 1.0	7.0± 5.9	7.8± 0.4
as84	14	*Betula glandulosa – Salix spp. – Potentilla fruticosa / Carex scirpoidea*	199.3± 92.9	5.4± 0.8	1809.3± 279.0	6.2± 0.7	6.1± 5.3	7.8± 0.4
as18	36	*Betula glandulosa – Arctostaphylos uva-ursi – Salix glauca / Elymus innovatus*	133.1± 76.0	4.2± 1.4	1816.9± 264.1	5.1± 1.8	13.7± 17.5	7.8± 0.4
as107	12	*Pinus contorta / Juniperus communis – Arctostaphylos uva-ursi – Shepherdia canadensis*	212.7± 57.2	2.8± 0.5	1837.5± 186.3	3.7± 1.2	59.5± 13.5	7.9± 0.3
as88	15	*Pinus contorta – Picea engelmannii / Shepherdia canadensis – Arctostaphylos uva-ursi – Juniperus communis / Elymus innovatus*	204.0± 56.1	2.6± 0.7	1844.7± 114.1	4.3± 1.4	38.3± 16.0	7.9± 0.3
as131	6	*Salix farriae – Salix barclayi* (- *Salix spp.*) / Herb	202.5± 58.1	4.6± 1.5	1860.0± 93.2	6.3± 1.0	19.4± 17.0	7.5± 0.5
as31	11	*Salix spp. – Betula glandulosa / Carex spp. / Aulacomnium palustre*	130.7± 123.6	4.8± 1.3	1867.3± 251.3	7.1± 1.8	6.7± 11.0	7.6± 0.5
as87	3	*Picea engelmannii / Salix vestita – Potentilla fruticosa / Valeriana sitchensis / Carex spp. / Dicranum scoparium*	120.0± 170.4	5.0± 0.0	1880.0± 321.4	±	28.0± 28.2	7.7± 0.6
as577	5	*Abies lasiocarpa / Rhododendron albiflorum – Phyllodoce empetriformis*	135.0± 105.5	3.3± 0.5	1890.0± 56.6	4.5± 1.0	51.0± 21.6	8.0± 0.0
as22	51	*Arctostaphylos uva-ursi – Juniperus communis / Elymus innovatus*	192.2± 39.4	2.4± 0.5	1904.6± 304.7	3.3± 0.9	53.8± 18.5	7.8± 0.4
as535	9	*Abies lasiocarpa / Salix vestita – Salix glauca – Salix barrattiana / Artemisia norvegica*	130.0± 106.6	3.2± 1.2	1910.0± 185.1	5.1± 0.3	44.1± 11.6	7.6± 0.5
as20	26	*Salix glauca – Betula glandulosa*	173.9± 88.2	3.7± 1.3	1923.1± 238.2	4.8± 1.5	24.4± 19.9	7.7± 0.5
as8	38	*Salix glauca – Salix barrattiana – Betula glandulosa / Fragaria virginiana*	149.5± 110.0	4.3± 1.1	1951.2± 226.1	5.7± 1.4	11.2± 16.3	7.6± 0.5
as135	8	*Vaccinium scoparium – Juniperus communis / Epilobium angustifolium / Polytrichum juniperinum*	236.3± 85.9	3.0± 0.0	1981.3± 191.3	3.0± 0.0	34.6± 11.5	7.8± 0.5
as365	3	*Vaccinium membranaceum / Epilobium angustifolium*	180.0± 162.2	2.5± 0.7	1996.7± 92.9	4.0± 1.4	47.3± 24.8	7.7± 0.6
as318	11	*Salix glauca – Betula glandulosa – Potentilla fruticosa / Danthonia californica*	114.5± 61.6	4.7± 1.0	2001.8± 146.1	5.9± 0.8	3.7± 2.6	7.6± 0.5
as515	4	*Salix glauca – Salix barrattiana – Arctostaphylos uva-ursi / Koeleria macrantha / Tortula ruralis*	180.0± 52.0	2.8± 0.5	2005.0± 85.8	5.0± 0.0	44.5± 27.4	7.5± 0.6
as93	15	*Salix barrattiana* (- *Salix spp.*) / Herb / *Aulacomnium palustre*	156.0± 104.7	5.7± 1.0	2034.0± 173.9	7.3± 1.4	7.5± 5.2	7.5± 0.5
as192	55	*Salix glauca – Arctostaphylos uva-ursi / Elymus innovatus*	195.3± 67.2	3.0± 1.0	2063.8± 209.0	4.6± 1.0	36.3± 23.1	7.5± 0.5
as80	11	*Vaccinium scoparium – Salix spp. / Dicranum scoparium – Barbilophozia lycopodioides*	135.0± 115.6	4.4± 1.1	2070.9± 127.3	5.4± 0.7	21.8± 18.9	7.6± 0.5
as7	41	*Salix barrattiana – Salix glauca / Trollius albiflorus / Aulacomnium palustre – Tomenthypnum nitens*	171.4± 92.4	4.8± 1.2	2071.2± 157.9	6.4± 1.1	15.4± 15.7	7.4± 0.5
as116	25	*Vaccinium scoparium – Vaccinium myrtillus*	170.6± 90.0	2.9± 0.4	2096.0± 175.1	4.9± 0.7	29.9± 20.5	7.8± 0.4
as115	5	*Salix arctica / Erigeron peregrinus*	171.0± 66.7	5.0±	2196.0± 125.2	5.5± 1.0	14.0± 8.7	7.4± 0.5

Group	N	Group name	Aspect	Drainage	Elevation	Moisture	Slope	NatSubR
as266	5	*Salix reticulata – Dryas octopetala – Cassiope tetragona* / Lichen	123.8± 56.6	2.8± 1.0	2214.0± 61.1	4.6± 0.9	13.6± 7.9	7.2± 0.4
as716	3	*Salix arctica / Equisetum scirpoides / Tortula norvegica* – Pert dac	150.0± 26.0	4.5± 0.7	2223.3± 150.4	4.3± 2.1	4.3± 3.2	7.0± 0.0
as63	25	*Salix arctica / Aulacomnium palustre*	109.8± 104.2	4.3± 1.4	2244.2± 142.0	5.7± 1.5	22.7± 18.3	7.3± 0.5
as89	23	*Salix arctica / Antennaria lanata – Artemisia norvegica*	173.6± 86.9	3.4± 0.7	2244.3± 109.8	5.2± 0.4	20.5± 12.8	7.3± 0.4
as10	7	*Salix reticulata – Salix arctica / Potentilla diversifolia*	194.9± 98.2	2.6± 0.5	2261.4± 226.7	4.9± 1.3	21.4± 12.3	7.1± 0.4
as144	3	*Salix arctica – Salix reticulata / Sibbaldia procumbens / Carex spp. / Polytrichum spp.*	180.0± 63.6	±	2373.3± 106.0	5.0± 0.0	2.0± 2.8	7.0± 0.0

Table 3. List of environmental variables used in community descriptions and their associated units (after Alberta Environmental Protection 1994).

Variable	Units
Aspect	Degrees
Slope	Percent
Elevation	Meters above sea level
Moisture	Categorical scale (0 = very xeric, 4 = mesic, 8 = hydric)
Nutrient	Categorical scale (1 = oligotrophic, 5 = eutrophic)
Drainage	Categorical scale (1 = very rapidly drained, 7 = very poorly drained)
Natural Subregion	Categorical (7 = alpine, 8 = subalpine, 9 = montane)

Rare Plant Community Types and Future Research Needs

This report presents a classification system based on a quantitative analysis of species abundances from an incomplete dataset. Groups were classified based on their resemblance to each other in terms of species composition. Obviously, the conservation status of the groups identified in this report will need to be interpreted in terms of what is known about their ecology and distribution, and supplemented by field work.

Defining rare communities based on information from the ESIS database is difficult, since it is not possible to determine whether a particular group is uncommon in the database due to a lack of sampling of that community type, or due to a community actually being restricted in extent or abundance in the field. The groups in this report will need to be linked to the existing ANHIC plant community tracking list (Allen 2000) and other sources of information in order to identify rare Rocky Mountain Shrubland communities. Communities which contain a particular species of interest can be found by a query of the output files, or by examination of the complete species/group tables (Appendix 3).

In order to better understand the plant communities of the Rocky Mountain Region, more field work or incorporation of existing data sets is needed from the areas outside of Banff and Jasper National Parks which have not been well sampled by previous studies. There is very little information in the ESIS database on plant communities from the majority of the Rocky Mountain Natural Region outside the National Parks, and future studies should concentrate on describing the vegetation in these areas in order to understand and monitor the communities which exist in this diverse landscape.

Community Descriptions

The following pages contain the descriptive summaries for each of the community types recognized by this analysis, with communities listed in order of their group number. Complete listings of individual species covers for each group can be found in Appendix 3.

For each group, the community name is followed by the group number, and the number of plots included in the group. The main species in each group are listed in order of decreasing mean percent cover.

Values of environmental variables for the plots in the group are included in each

description. Mean, minimum and maximum values of each variable are listed. The units associated with each variable (Table 3) follow the format used in the Alberta Ecological Land Survey Site Description Manual (Alberta Environmental Protection 1994). The descriptions also include a complete list of plots included in the group, and their location (latitude and longitude) is listed when it was present in the ESIS database.

Montane Groups

Picea glauca – Populus tremuloides / Salix bebbiana – Shepherdia canadensis / Elymus innovatus

Group m1
N = 5

Species	Cover
ELYMUS INNOVATUS	35
SALIX BEBBIANA	8
PICEA GLAUCA	8
POPULUS TREMULOIDES	5
SHEPHERDIA CANADENSIS	5
ROSA ACICULARIS	4
FRAGARIA VIRGINIANA	3
ARCTOSTAPHYLOS UVA-URSI	3
AMELANCHIER ALNIFOLIA	2
SALIX SPP.	2
LATHYRUS OCHROLEUCUS	2
BRYUM PSEUDOTRIQUETRUM	2

Variable	Mean	Min	Max
Aspect	201.0	135.0	284.0
Drainage	4.3	3.0	6.0
Elevation	1128.0	1000.0	1340.0
Moisture	6.0	5.0	8.0
Nutrient	4.0	3.0	5.0
Slope	9.2	0.0	25.0

ESIS Plot #	Location (lat/long)					
17SW2354	51°	17'	0" N	114°	38'	0" W
37YH1217	53°	22'	0" N	117°	47'	0" W
54AV9116	53°	22'	0" N	117°	45'	0" W
94JI5007	52°	37'	19" N	117°	51'	30" W
94JI8004	53°	10'	10" N	118°	0'	33" W

Notes

Salix myrtillifolia – Betula pumila / Carex spp.. – Juncus balticus
Group m2
N = 2

Species	Cover
SALIX MYRTILLIFOLIA	23
BETULA PUMILA	9
JUNCUS BALTICUS	7
CAREX ROSTRATA	6
CAREX SPP.	5
GEUM RIVALE	3
FESTUCA RUBRA	3
RUBUS ARCTICUS	2

Variable	Mean	Min	Max
Aspect	310.0	300.0	320.0
Drainage	6.5	6.0	7.0
Elevation	1440.0	1440.0	1440.0
Moisture	8.0	8.0	8.0
Nutrient	4.0	4.0	4.0
Slope	5.5	5.0	6.0

ESIS Plot #	Location (lat/long)					
32BKR004	49°	59'	0" N	114°	14'	0" W
32BKR011	49°	59'	0" N	114°	14'	0" W

Notes

Salix petiolaris - Betula glandulosa – Salix candida / Deschampsia cespitosa – Juncus balticus

Group m4
N = 4

Species	Cover
SALIX PETIOLARIS	34
DESCHAMPSIA CESPITOSA	15
BETULA GLANDULOSA	10
SALIX CANDIDA	6
JUNCUS BALTICUS	5
AGROPYRON TRACHYCAULUM	4
ASTER LAEVIS	4
CAREX SPP.	4
THALICTRUM OCCIDENTALE	4
BETULA PUMILA	3
MELICA SMITHII	3
SALIX DISCOLOR	3
ASTER SPP.	2
FRAGARIA VIRGINIANA	2
SCHIZACHNE PURPURASCENS	2
CAREX ROSTRATA	2
POTENTILLA FRUTICOSA	2

Variable	Mean	Min	Max
Aspect	184.5	99.0	270.0
Drainage	5.3	4.0	6.0
Elevation	1462.8	1440.0	1499.0
Moisture	7.0	6.0	9.0
Nutrient	3.8	3.0	4.0
Slope	1.5	0.0	3.0

ESIS Plot #	Location (lat/long)					
32BKR021	50°	0'	0" N	114°	12'	0" W
32BKR022	50°	0'	0" N	114°	14'	0" W
34BK0003	49°	59'	0" N	114°	14'	0" W
34BK0010	49°	58'	0" N	114°	12'	0" W

Potentilla fruticosa – Symphoricarpos occidentalis / Festuca scabrella – Festuca idahoensis – Bromus inermis

Group m6
N = 8

Species	Cover
FESTUCA SCABRELLA	17
FESTUCA IDAHOENSIS	11
BROMUS INERMIS	7
SYMPHORICARPOS OCCIDENTALIS	6
POTENTILLA FRUTICOSA	5
FRAGARIA VIRGINIANA	4
GALIUM BOREALE	4
JUNIPERUS HORIZONTALIS	3
ROSA WOODSII	3
ELAEAGNUS COMMUTATA	3
GEUM TRIFLORUM	3
POA PRATENSIS	3
ASTER LAEVIS	3
PSEUDOTSUGA MENZIESII	3
TARAXACUM OFFICINALE	3
THERMOPSIS RHOMBIFOLIA	2
PENSTEMON CONFERTUS	2
POA PATTERSONII	2
VICIA AMERICANA	2

Variable	Mean	Min	Max
Aspect	152.1	45.0	340.0
Drainage	3.0	2.0	4.0
Elevation	1364.3	1250.0	1554.0
Moisture	4.3	3.0	5.0
Nutrient	3.1	3.0	4.0
Slope	15.7	8.0	30.0

ESIS Plot #	Location (lat/long)					
32BKR027	49°	59'	0" N	114°	14'	0" W
32EB0001	49°	36'	0" N	110°	18'	0" W
32EB0006	49°	37'	0" N	110°	18'	0" W

32EB0010	49°	37'	0" N	110°	19'	0" W
32EB0099	49°	41'	0" N	110°	17'	0" W
32EB0129	49°	40'	0" N	110°	19'	0" W
32EB0136	49°	41'	0" N	110°	15'	0" W
34CP2001	49°	37'	0" N	114°	26'	0" W

Notes

Symphoricarpos occidentalis – Rosa woodsii / Poa pratensis – Bromus inermis
Group m10
N = 13

Species	Cover
SYMPHORICARPOS OCCIDENTALIS	25
ROSA WOODSII	18
POA PRATENSIS	18
BROMUS INERMIS	8
POA PATTERSONII	4
ELAEAGNUS COMMUTATA	3
PRUNUS VIRGINIANA	3
ASTER LAEVIS	2

Variable	Mean	Min	Max
Aspect	119.5	5.0	335.0
Drainage	3.7	3.0	5.0
Elevation	1194.4	1111.0	1274.0
Moisture	4.2	4.0	5.0
Nutrient	3.0	3.0	3.0
Slope	10.9	0.0	42.0

ESIS Plot #	Location (lat/long)					
32EB0012	49°	35'	0" N	110°	22'	0" W
32EB0042	49°	34'	0" N	110°	25'	0" W
32EB0061	49°	36'	0" N	110°	29'	0" W
32EB0068	49°	37'	0" N	110°	26'	0" W
32EB0070	49°	36'	0" N	110°	29'	0" W
32EB0077	49°	38'	0" N	110°	25'	0" W
32EB0108	49°	38'	0" N	110°	29'	0" W
32EB0117	49°	41'	0" N	110°	23'	0" W
32EB0120	49°	40'	0" N	110°	23'	0" W
32EB0131	49°	40'	0" N	110°	21'	0" W
32EB0140	49°	42'	0" N	110°	10'	0" W
32EB0141	49°	42'	0" N	110°	12'	0" W
32EB0146	49°	42'	0" N	110°	10'	0" W

Notes

Symphoricarpos occidentalis – Artemisia cana / Poa compressa – Stipa spp.
Group m11
N = 5

Species	Cover
SYMPHORICARPOS OCCIDENTALIS	10
ARTEMISIA CANA	6
POA COMPRESSA	6
STIPA CURTISETA	6
STIPA VIRIDULA	5
AMELANCHIER ALNIFOLIA	4
KOELERIA MACRANTHA	3
CAREX PENSYLVANICA	2
AGROPYRON TRACHYCAULUM	2

Variable	Mean	Min	Max
Aspect	209.0	140.0	260.0
Drainage	3.0	1.0	5.0
Elevation	1197.8	1138.0	1250.0
Moisture	3.4	3.0	4.0
Nutrient	3.0	3.0	3.0
Slope	26.6	13.0	35.0

ESIS Plot #	Location (lat/long)					
32EB0014	49°	35'	0" N	110°	21'	0" W
32EB0016	49°	35'	0" N	110°	21'	0" W
32EB0044	49°	34'	0" N	110°	25'	0" W
32EB0088	49°	38'	0" N	110°	25'	0" W
32EB0125	49°	39'	0" N	110°	23'	0" W

Notes

Juniperus horizontalis – Arctostaphylos uva-ursi / Agropyron dasystachyum – Calamagrostis purpurascens

Group m13
N = 5

Species	Cover
JUNIPERUS HORIZONTALIS	25
AGROPYRON DASYSTACHYUM	13
ARCTOSTAPHYLOS UVA-URSI	11
CALAMAGROSTIS PURPURASCENS	7
PICEA GLAUCA	4
ELYMUS INNOVATUS	2
CAREX STENOPHYLLA	2
ARTEMISIA FRIGIDA	2

Variable	Mean	Min	Max
Aspect	197.2	89.0	259.0
Drainage	2.6	1.0	4.0
Elevation	1269.8	1050.0	1372.0
Moisture	3.2	1.0	5.0
Nutrient	3.0	3.0	3.0
Slope	21.8	1.0	72.0

ESIS Plot #	Location (lat/long)					
32EB0027	49°	33'	0" N	110°	22'	0" W
34KP0004	52°	1'	0" N	116°	26'	0" W
34KP0009	52°	2'	0" N	116°	24'	0" W
34KP0037	52°	1'	0" N	116°	24'	0" W
94JE9016	53°	13'	11" N	117°	51'	44" W

Notes

Potentilla fruticosa – Salix planifolia – Rosa woodsii / Agropyron repens – Poa pratensis – Stipa viridula

Group m16
N = 4

Species	Cover
POA PRATENSIS	49
AGROPYRON REPENS	9
POTENTILLA FRUTICOSA	7
SALIX PLANIFOLIA	6
ROSA WOODSII	6
STIPA VIRIDULA	5
SYMPHORICARPOS OCCIDENTALIS	5
ASTER FALCATUS	5
ARTEMISIA CANA	3
SOLIDAGO RIGIDA	2

Variable	Mean	Min	Max
Aspect	153.3	40.0	220.0
Drainage	3.7	3.0	5.0
Elevation	1195.8	1160.0	1233.0
Moisture	4.8	4.0	6.0
Nutrient	3.0	3.0	3.0
Slope	14.3	0.0	21.0

ESIS Plot #	Location (lat/long)					
32EB0053	49°	36'	0" N	110°	22'	0" W
32EB0130	49°	40'	0" N	110°	19'	0" W
32EB0133	49°	41'	0" N	110°	19'	0" W
94JI5082	52°	46'	52" N	117°	57'	40" W

Notes:

Salix bebbiana – Salix glauca – Salix lanata / Deschampsia cespitosa – Phleum pratense – Poa pratensis

Group m22

N = 3

Species	Cover
SALIX BEBBIANA	67
SALIX GLAUCA	25
SALIX LANATA	25
DESCHAMPSIA CESPITOSA	13
PHLEUM PRATENSE	10
POA PRATENSIS	10
ROSA WOODSII	4
ROSA ACICULARIS	3
SYMPHORICARPOS OCCIDENTALIS	3
RIBES OXYCANTHOIDES	3
CORNUS STOLONIFERA	2
POA PALUSTRIS	2

Variable	Mean	Min	Max
Aspect	150.0	90.0	270.0
Drainage	5.7	5.0	6.0
Elevation	1366.0	1193.0	1480.0
Moisture	6.3	6.0	7.0
Nutrient	3.7	3.0	4.0
Slope	3.3	2.0	5.0

ESIS Plot #	Location (lat/long)					
32EB0098	49°	40'	0" N	110°	21'	0" W
34BK0014	49°	56'	0" N	114°	15'	0" W
34BK0037	49°	53'	0" N	114°	12'	0" W

Notes

Crataegus douglasii / Viola canadensis - Osmorhiza depauperata – Parietaria pensylvanica

Group m36

N = 1

Species	Cover
CRATAEGUS DOUGLASII	96
VIOLA CANADENSIS	25
OSMORHIZA DEPAUPERATA	16
PARIETARIA PENSYLVANICA	7
RUBUS IDAEUS	4
AGROPYRON TRACHYCAULUM	2
CAREX SPRENGELLII	2

Variable	Mean	Min	Max
Aspect	350.0	350.0	350.0
Drainage	3.0	3.0	3.0
Elevation	1241.0	1241.0	1241.0
Moisture	5.0	5.0	5.0
Nutrient	3.0	3.0	3.0
Slope	10.0	10.0	10.0

ESIS Plot #	Location (lat/long)
32EB0148	49° 41' 0" N 110° 3' 0" W

Notes

Pinus contorta / Vaccinium caespitosum - Amelanchier alnifolia – Arctostaphylos uva-ursi - Juniperus communis / Umbilicaria deusta

Group m37
N = 4

Species	Cover
VACCINIUM CAESPITOSUM	18
PINUS CONTORTA	14
AMELANCHIER ALNIFOLIA	8
UMBILICARIA DEUSTA	8
ARCTOSTAPHYLOS UVA-URSI	7
JUNIPERUS COMMUNIS	5
POPULUS TREMULOIDES	4
POLYTRICHUM COMMUNE	3
ABIES LASIOCARPA	2
ARNICA CORDIFOLIA	2
FRAGARIA VIRGINIANA	2

Variable	Mean	Min	Max
Aspect	210.8	183.0	230.0
Drainage	2.3	2.0	3.0
Elevation	1624.8	1500.0	1768.0
Moisture	3.3	2.0	5.0
Nutrient			
Slope	36.3	25.0	50.0

ESIS Plot #	Location (lat/long)					
32SC0001	49°	17'	0" N	114°	16'	0" W
32SC0014	49°	17'	0" N	114°	16'	0" W
32SC0018	49°	17'	0" N	114°	16'	0" W
32SC0023	49°	17'	0" N	114°	16'	0" W

Notes

Populus balsamifera / Elaeagnus commutata - Amelanchier alnifolia - Juniperus horizontalis / Agropyron dasystachyum

Group m38
N = 3

Species	Cover
AGROPYRON DASYSTACHYUM	49
ELAEAGNUS COMMUTATA	12
POPULUS BALSAMIFERA	8
JUNIPERUS HORIZONTALIS	7
AMELANCHIER ALNIFOLIA	6
ARTEMISIA FRIGIDA	4
ELYMUS INNOVATUS	3
LUPINUS SERICEUS	3
SALIX SPP.	3
ROSA ACICULARIS	3
OXYTROPIS SERICEA	2
PICEA GLAUCA	2

Variable	Mean	Min	Max
Aspect	120.5	21.0	220.0
Drainage	3.0	3.0	3.0
Elevation	1473.3	1372.0	1676.0
Moisture	4.0	2.0	5.0
Nutrient	2.5	2.0	3.0
Slope	12.7	1.0	35.0

ESIS Plot #	Location (lat/long)					
32SC0007	49°	17'	0" N	114°	16'	0" W
34KP0010	52°	2'	0" N	116°	24'	0" W
34KP0012	52°	3'	0" N	116°	24'	0" W

Notes

Juniperus communis – Shepherdia canadensis* / Herb / *Stipa columbiana
Group m39
N = 2

Species	Cover
JUNIPERUS COMMUNIS	9
SHEPHERDIA CANADENSIS	9
STIPA COLUMBIANA	8
ANTENNARIA ROSEA	8
GAILLARDIA ARISTATA	7
ASTRAGALUS STRIATUS	5
ERIGERON COMPOSITUS	5
SENECIO CANUS	5
FESTUCA SAXIMONTANA	4
POTENTILLA FRUTICOSA	4
SELAGINELLA DENSA	4
GALIUM BOREALE	4
SOLIDAGO MISSOURIENSIS	3
ACHILLEA MILLEFOLIUM	2
CAREX UMBELLATA	2
OXYTROPIS CUSICKII	2
OXYTROPIS SPLENDENS	2
PENSTEMON ALBERTINUS	2

Variable	Mean	Min	Max
Aspect	192.0	180.0	204.0
Drainage	2.0	2.0	2.0
Elevation	1512.5	1410.0	1615.0
Moisture	2.5	2.0	3.0
Nutrient			
Slope	41.5	35.0	48.0

ESIS Plot #	Location (lat/long)	
32SC0008	49° 17' 0" N	114° 16' 0" W
94BK6014	51° 9' 51" N	115° 38' 34" W

Notes

Salix spp. – Betula glandulosa / Equisetum arvense
Group m46
N = 2

Species	Cover
SALIX SPP.	45
EQUISETUM ARVENSE	20
BETULA GLANDULOSA	8

Variable	Mean	Min	Max
Aspect	90.0	90.0	90.0
Drainage	3.0	3.0	3.0
Elevation	1268.5	980.0	1557.0
Moisture	6.0	5.0	7.0
Nutrient	4.0	4.0	4.0
Slope	2.5	0.0	5.0

ESIS Plot #	Location (lat/long)
34BK0032	50° 1' 0" N 114° 14' 0" W
94JM7002	53° 13' 32" N 117° 49' 52" W

Notes

Pinus contorta – Picea glauca / Shepherdia canadensis - Arctostaphylos uva-ursi - Juniperus communis / Elymus innovatus

Group m49
N = 14

Species	Cover
SHEPHERDIA CANADENSIS	14
PINUS CONTORTA	12
ARCTOSTAPHYLOS UVA-URSI	11
ELYMUS INNOVATUS	6
PICEA GLAUCA	5
JUNIPERUS COMMUNIS	5
JUNIPERUS HORIZONTALIS	4
CALAMAGROSTIS RUBESCENS	3
ASTER CONSPICUUS	3
LINNAEA BOREALIS	3

Variable	Mean	Min	Max
Aspect	192.0	58.0	272.0
Drainage	2.8	2.0	4.0
Elevation	1415.1	1150.0	2010.0
Moisture	4.4	3.0	5.0
Nutrient	2.7	2.0	3.0
Slope	16.6	0.0	80.0

ESIS Plot #	Location (lat/long)					
34KP0002	51°	59'	0" N	116°	29'	0" W
34KP0007	52°	2'	0" N	116°	26'	0" W
34KP0016	52°	4'	0" N	116°	24'	0" W
34KP0024	52°	7'	0" N	116°	24'	0" W
34KP0038	52°	1'	0" N	116°	24'	0" W
34PS1564	52°	12'	0" N	116°	27'	0" W
34PS1565	52°	8'	0" N	116°	26'	0" W
94AW5121	51°	11'	18" N	115°	43'	38" W
94IC7040	51°	56'	50" N	116°	47'	3" W
94JI5046	52°	55'	58" N	117°	59'	4" W
94JI5096	52°	52'	19" N	118°	9'	52" W
94JI7027	53°	6'	18" N	117°	57'	11" W

94JM7084	52°	35'	23" N	117°	49'	35" W
94PA7009	51°	15'	31" N	115°	28'	30" W

Notes

Picea glauca / Arctostaphylos uva-ursi – Potentilla fruticosa – Juniperus horizontalis / Carex scirpoidea – Koeleria macrantha

Group m56
N = 10

Species	Cover
ARCTOSTAPHYLOS UVA-URSI	21
POTENTILLA FRUTICOSA	12
JUNIPERUS HORIZONTALIS	11
PICEA GLAUCA	7
ANTENNARIA PARVIFLORA	5
KOBRESIA MYOSUROIDES	4
CAREX SCIRPOIDEA	4
KOELERIA MACRANTHA	4
ZIGADENUS ELEGANS	4
PINUS FLEXILIS	3
ARTEMISIA FRIGIDA	3
BETULA OCCIDENTALIS	2
ELYMUS INNOVATUS	2
ERIGERON CAESPITOSUS	2
DANTHONIA PARRYI	2

Variable	Mean	Min	Max
Aspect	234.3	149.0	315.0
Drainage	3.1	2.0	6.0
Elevation	1257.4	1000.0	1480.0
Moisture	4.2	2.0	7.0
Nutrient	3.0	2.0	4.0
Slope	19.4	0.0	50.0

ESIS Plot #	Location (lat/long)					
34KP0021	52°	3'	0" N	116°	23'	0" W
34KP0026	52°	6'	0" N	116°	23'	0" W
34KP0041	52°	2'	0" N	116°	24'	0" W
34KP0042	52°	2'	0" N	116°	24'	0" W
34YA1015	51°	7'	0" N	115°	4'	0" W
94JI8003	53°	11'	6" N	117°	57'	27" W

94JM7008	53°	13'	24" N	117°	55'	48"	W
94PA7048	51°	57'	59" N	116°	45'	58"	W
94SJ7014	53°	7'	32" N	117°	58'	4"	W
94SJ8003	53°	7'	37" N	117°	58'	18"	W

Notes

Pinus flexilis and *Betula occidentalis* are present in this group.

Arctostaphylos uva-ursi – Shepherdia canadensis / Elymus innovatus
Group m63
N = 15

Species	Cover
ARCTOSTAPHYLOS UVA-URSI	32
ELYMUS INNOVATUS	7
SHEPHERDIA CANADENSIS	5
PINUS CONTORTA	3
ROSA ACICULARIS	3
JUNIPERUS COMMUNIS	3
FESTUCA SCABRELLA	2

Variable	Mean	Min	Max
Aspect	186.6	45.0	270.0
Drainage	2.2	1.0	3.0
Elevation	1338.7	1000.0	1630.0
Moisture	3.3	2.0	4.0
Nutrient	2.3	2.0	3.0
Slope	36.4	2.0	68.0

ESIS Plot #	Location (lat/long)					
34PC1005	49°	4'	0" N	113°	36'	0" W
34PS1562	52°	12'	0" N	116°	27'	0" W
34PS1563	52°	12'	0" N	116°	27'	0" W
94AW5147	51°	10'	53" N	115°	37'	27" W
94AW6038	51°	8'	39" N	115°	25'	1" W
94AW6041	51°	9'	19" N	115°	26'	49" W
94JC8001	51°	10'	28" N	115°	30'	28" W
94JD5007	51°	12'	33" N	115°	45'	0" W
94JI5050	53°	4'	30" N	118°	4'	12" W
94JI5054	53°	4'	27" N	118°	6'	58" W
94JI5088	52°	51'	27" N	118°	2'	21" W
94JI5112	52°	48'	29" N	118°	1'	50" W
94JI5131	52°	52'	40" N	118°	9'	39" W
94JI5143	53°	0'	55" N	118°	4'	58" W
94JI7028	53°	6'	7" N	117°	56'	11" W

***Alnus crispa - Symphoricarpos occidentalis – Amelanchier alnifolia – Salix scouleriana* / Herbs**

Group m64
N = 2

Species	Cover
ALNUS CRISPA	40
THALICTRUM VENULOSUM	35
ACTAEA RUBRA	8
SYMPHORICARPOS OCCIDENTALIS	8
VIOLA CANADENSIS	8
AMELANCHIER ALNIFOLIA	5
LATHYRUS OCHROLEUCUS	5
SALIX SCOULERIANA	5
ASTER SPP.	3
HEDYSARUM ALPINUM	3
PINUS CONTORTA	3
ROSA WOODSII	3
URTICA SPP.	3
VICIA AMERICANA	3
ARNICA CORDIFOLIA	2
HERACLEUM LANATUM	2

Variable	Mean	Min	Max
Aspect	112.5	45.0	180.0
Drainage	4.0	4.0	4.0
Elevation	1590.0	1580.0	1600.0
Moisture	5.5	5.0	6.0
Nutrient	3.0	3.0	3.0
Slope	47.5	20.0	75.0

ESIS Plot #	Location (lat/long)					
34PC1006	49°	5'	0" N	113°	46'	0" W
94JI7020	53°	6'	39" N	118°	4'	21" W

Notes

Picea glauca / Alnus tenuifolia – Rosa acicularis – Shepherdia canadensis / Equisetum arvense / Thuidium abietinum

Group m69
N = 7

Species	Cover
EQUISETUM ARVENSE	21
PICEA GLAUCA	19
THUIDIUM ABIETINUM	11
ALNUS TENUIFOLIA	7
ROSA ACICULARIS	5
SHEPHERDIA CANADENSIS	5
CORNUS STOLONIFERA	4
HYPNUM LINDBERGII	4
CAREX CONCINNA	2
CALLIERGON GIGANTEUM	2
ELAEAGNUS COMMUTATA	2
LINNAEA BOREALIS	2

Variable	Mean	Min	Max
Aspect	192.3	127.0	315.0
Drainage	3.0	3.0	3.0
Elevation	1019.1	970.0	1090.0
Moisture	6.2	5.0	8.0
Nutrient	4.0	4.0	4.0
Slope	15.7	0.0	80.0

ESIS Plot #	Location (lat/long)					
34PS1603	53°	18'	0" N	117°	51'	0" W
94JI5130	53°	3'	3" N	118°	6'	21" W
94JI7008	53°	3'	54" N	118°	3'	17" W
94JI7009	53°	4'	57" N	118°	4'	24" W
94JM7001	53°	12'	46" N	117°	49'	53" W
94JM7012	53°	13'	0" N	117°	55'	49" W
94SJ7024	53°	13'	33" N	117°	55'	56" W

Notes

Dryas drummondii – Arctostaphylos uva-ursi - Elaeagnus commutata* / Herb / *Koeleria macrantha

Group 71
N = 2

Species	Cover
KOELERIA MACRANTHA	35
DRYAS DRUMMONDII	12
ASTRAGALUS STRIATUS	8
ARCTOSTAPHYLOS UVA-URSI	7
ELAEAGNUS COMMUTATA	5
OXYTROPIS MONTICOLA	5
ACHILLEA MILLEFOLIUM	5
JUNIPERUS HORIZONTALIS	4
TARAXACUM OFFICINALE	3
OXYTROPIS DEFLEXA	3
POTENTILLA FRUTICOSA	2

Variable	Mean	Min	Max
Aspect	90.0	90.0	90.0
Drainage	2.0	1.0	3.0
Elevation	1369.5	1360.0	1379.0
Moisture	4.0	4.0	4.0
Nutrient	3.0	3.0	3.0
Slope	1.0	1.0	1.0

ESIS Plot #	Location (lat/long)					
34YA1016	51°	8'	0" N	115°	4'	0" W
94AW6042	51°	9'	8" N	115°	26'	58" W

Notes

Salix arbusculoides / Equisetum fluviatile / Carex spp. / Sphagnum spp. - Tomenthypnum nitens

Group m74
N = 3

Species	Cover
TOMENTHYPNUM NITENS	28
CAREX AQUATILIS	24
SALIX ARBUSCULOIDES	12
EQUISETUM FLUVIATILE	7
CAREX ROSTRATA	5
DREPANOCLADUS REVOLVENS	5
SPHAGNUM FUSCUM	5
SPHAGNUM WARNSTORFII	4
PICEA GLAUCA	4
BETULA PUMILA	3
SALIX BEBBIANA	3

Variable	Mean	Min	Max
Aspect	45.0	0.0	135.0
Drainage	6.5	6.0	7.0
Elevation	1196.7	1130.0	1240.0
Moisture	8.5	8.0	9.0
Nutrient	4.0	4.0	4.0
Slope	0.7	0.0	2.0

ESIS Plot #	Location (lat/long)	
57WCA058	53° 17' 0" N	117° 47' 0" W
57WCA060	53° 17' 0" N	117° 47' 0" W
94AW5145	51° 10' 43" N	115° 43' 43" W

Notes

Rosa acicularis - Elaeagnus commutata – Salix scouleriana - Rubus idaeus – Lonicera dioica / Urtica spp. / Phleum pratense

Group m76
N = 4

Species	Cover
ROSA ACICULARIS	30
ELAEAGNUS COMMUTATA	19
SALIX SCOULERIANA	15
RUBUS IDAEUS	13
LONICERA DIOICA	6
PHLEUM PRATENSE	6
URTICA SPP.	6
SALIX BEBBIANA	4
SYMPHORICARPOS ALBUS	4
AGROPYRON TRACHYCAULUM	3

Variable	Mean	Min	Max
Aspect	217.3	158.0	315.0
Drainage	3.3	2.0	5.0
Elevation	1155.0	910.0	1270.0
Moisture	3.7	3.0	5.0
Nutrient	3.0	3.0	3.0
Slope	33.8	0.0	65.0

ESIS Plot #	Location (lat/long)					
57WCA104	54°	1'	0" N	119°	5'	0" W
57WCA105	54°	1'	0" N	119°	5'	0" W
94JI5135	52°	51'	16" N	118°	9'	18" W
94SJ8105	53°	3'	59" N	118°	3'	54" W

Notes

Picea engelmannii / Juniperus communis – Shepherdia canadensis / Koeleria macrantha

Group m84
N = 3

Species	Cover
PICEA ENGELMANNII	5
ARTEMISIA FRIGIDA	4
JUNIPERUS COMMUNIS	3
KOELERIA MACRANTHA	3
SHEPHERDIA CANADENSIS	3
ARCTOSTAPHYLOS UVA-URSI	2
POPULUS TREMULOIDES	2

Variable	Mean	Min	Max
Aspect	225.0	135.0	315.0
Drainage			
Elevation	1420.0	1200.0	1540.0
Moisture	2.0	2.0	2.0
Nutrient			
Slope	51.7	30.0	65.0

ESIS Plot #	Location (lat/long)	
94AW7013	51° 16' 37" N	115° 25' 18" W
94JI5036	53° 4' 5" N	118° 2' 46" W
94JI5038	53° 3' 42" N	118° 1' 39" W

Notes

An unusual group with low cover of all strata, possibly more appropriate as a 'Sparsely Vegetated' type. Found on sites with high slope, low moisture.

Betula pumila – Potentilla fruticosa – Salix spp. / Carex spp. – Deschampsia cespitosa - Juncus spp. / Drepanocladus spp. – Campylium stellatum

Group m85

N = 3

Species	Cover
BETULA PUMILA	20
CAREX SPP.	15
POTENTILLA FRUTICOSA	15
DREPANOCLADUS SPP.	13
SALIX MACCALLIANA	10
PICEA GLAUCA	9
JUNCUS SPP.	9
DESCHAMPSIA CESPITOSA	8
SALIX GLAUCA	8
SALIX SPP.	7
CAMPYLIUM STELLATUM	5
CAREX SCIRPOIDEA	5
VALERIANA DIOICA	3
CAREX AQUATILIS	3
ARCTOSTAPHYLOS UVA-URSI	2
BRYUM PSEUDOTRIQUETRUM	2

Variable	Mean	Min	Max
Aspect			
Drainage			
Elevation	1270.0	980.0	1440.0
Moisture	6.0	6.0	6.0
Nutrient			
Slope	0.0	0.0	0.0

ESIS Plot #	Location (lat/long)					
94BK5011	51°	15'	34" N	115°	51'	21" W
94JD5010	51°	12'	6" N	115°	45'	5" W
94JI5144	53°	1'	43" N	118°	5'	32" W

Notes

Picea mariana / Ledum groenlandicum – Alnus tenuifolia / Hylocomium splendens
Group m88
N = 3

Species	Cover
HYLOCOMIUM SPLENDENS	62
LEDUM GROENLANDICUM	25
PICEA MARIANA	11
ALNUS TENUIFOLIA	7
PINUS CONTORTA	5
PICEA ENGELMANNII	5
PLEUROZIUM SCHREBERI	4
CORNUS CANADENSIS	4
EQUISETUM ARVENSE	4
LINNAEA BOREALIS	3
ROSA ACICULARIS	3
SPHAGNUM SPP.	3

Variable	Mean	Min	Max
Aspect	0.0	0.0	0.0
Drainage			
Elevation	1270.0	1250.0	1300.0
Moisture	6.0	5.0	7.0
Nutrient			
Slope	24.0	0.0	72.0

ESIS Plot #	Location (lat/long)	
94JC6007	52° 40' 54" N	117° 52' 29" W
94JI5133	52° 52' 40" N	118° 9' 57" W
94JM7098	53° 10' 57" N	117° 49' 56" W

Notes

Picea mariana / Salix myrtillifolia – Ledum groenlandicum / Carex spp. / Tomenthypnum nitens

Group m92
N = 2

Species	Cover
SALIX MYRTILLIFOLIA	30
TOMENTHYPNUM NITENS	25
CAREX VAGINATA	21
PICEA MARIANA	19
CAREX NORVEGICA	15
JUNCUS BALTICUS	15
SALIX SPP.	13
DREPANOCLADUS REVOLVENS	10
HYLOCOMIUM SPLENDENS	10
LEDUM GROENLANDICUM	7
AULACOMNIUM PALUSTRE	6
VACCINIUM VITIS-IDAEA	5
ROSA ACICULARIS	4
CAREX AQUATILIS	3
EQUISETUM ARVENSE	3
EQUISETUM SCIRPOIDES	3
SPHAGNUM WARNSTORFII	3

Variable	Mean	Min	Max
Aspect	225.0	225.0	225.0
Drainage			
Elevation	1230.0	1160.0	1300.0
Moisture	8.0	8.0	8.0
Nutrient			
Slope	0.0	0.0	0.0

ESIS Plot #	Location (lat/long)					
94JD9018	53°	12'	34" N	118°	8'	5" W
94JI7011	52°	54'	48" N	118°	6'	16" W

Notes

Pinus contorta / Alnus spp. - Linnaea borealis / Cornus canadensis / Elymus innovatus
Group 104
N = 3

Species	Cover
ALNUS TENUIFOLIA	18
PINUS CONTORTA	17
ALNUS CRISPA	10
CORNUS CANADENSIS	8
LINNAEA BOREALIS	6
ELYMUS INNOVATUS	5
RUBUS PARVIFLORUS	5
ROSA ACICULARIS	5
RUBUS PUBESCENS	4
HYLOCOMIUM SPLENDENS	3
ORTHILIA SECUNDA	3
LONICERA INVOLUCRATA	2
PLEUROZIUM SCHREBERI	2
EQUISETUM ARVENSE	2

Variable	Mean	Min	Max
Aspect	157.5	90.0	225.0
Drainage			
Elevation	1366.7	1300.0	1460.0
Moisture	5.0	5.0	5.0
Nutrient			
Slope	21.7	12.0	35.0

ESIS Plot #	Location (lat/long)					
94JI5108	52°	55'	18" N	118°	7'	58" W
94JM7095	52°	40'	54" N	117°	51'	16" W
94SJ7068	52°	52'	22" N	118°	13'	56" W

Notes

Dryas drummondii – Alnus tenuifolia
Group m105
N = 1

Species	Cover
DRYAS DRUMMONDII	25
ALNUS TENUIFOLIA	10
POPULUS BALSAMIFERA	5
PICEA GLAUCA	3

Variable	Mean	Min	Max
Aspect	225.0	225.0	225.0
Drainage			
Elevation	1210.0	1210.0	1210.0
Moisture	5.0	5.0	5.0
Nutrient			
Slope	10.0	10.0	10.0

ESIS Plot #	Location (lat/long)
94JI5110	52° 46' 43" N 117° 56' 7" W

Notes

Salix planifolia* / Herb / *Poa spp. – Carex spp. / Campylium stellatum
Group m128
N = 1

Species	Cover
SALIX PLANIFOLIA	56
POA SPP.	17
CAMPYLIUM STELLATUM	12
CAREX VIRIDULA	7
JUNCUS ALPINOARTICULATUS	7
VIOLA PALUSTRIS	6
ASTER BOREALIS	3
CAREX ROSTRATA	3
DREPANOCLADUS REVOLVENS	3
FISSIDENS ADIANTHOIDES	2

Variable	Mean	Min	Max
Aspect			
Drainage	7.0	7.0	7.0
Elevation	990.0	990.0	990.0
Moisture	9.0	9.0	9.0
Nutrient			
Slope	0.0	0.0	0.0

ESIS Plot #	Location (lat/long)
94JM8118	53° 11' 43" N 117° 55' 51" W

Notes

Alpine/Subalpine Groups

Pinus contorta / Alnus crispa – Salix scouleriana – Linnaea borealis / Festuca idahoensis

Group as1
N = 8

Species	Cover
ALNUS CRISPA	18
PINUS CONTORTA	12
FESTUCA IDAHOENSIS	8
SALIX SCOULERIANA	7
LINNAEA BOREALIS	5
ELYMUS INNOVATUS	4
VIBURNUM EDULE	4
PLEUROZIUM SCHREBERI	3
FESTUCA SCABRELLA	3
ORTHILIA SECUNDA	2
CORNUS CANADENSIS	2

Variable	Mean	Min	Max
NatSubR	8.0	8.0	8.0
Drainage	3.3	3.0	4.0
Moisture	4.4	3.0	5.0
Elevation	1535.0	1190.0	1890.0
Aspect	196.5	100.0	270.0
Slope	32.0	0.0	49.0

ESIS Plot #	Location (lat/long)					
17SR2524	52°	9'	0" N	115°	26'	0" W
31GP8509	54°	20'	0" N	119°	39'	0" W
31GP8533	54°	20'	0" N	119°	39'	0" W
34CN1001	49°	41'	0" N	114°	35'	0" W
34GP0105	53°	54'	0" N	119°	11'	0" W
67RD4911	51°	31'	0" N	115°	22'	0" W
94JM7096	52°	40'	55" N	117°	50'	18" W
94SJ9004	53°	23'	24" N	118°	16'	36" W

Ledum groenlandicum – Shepherdia canadensis / Elymus innovatus / Hylocomium splendens – Pleurozium schreberi

Group as2
N = 30

Species	Cover
HYLOCOMIUM SPLENDENS	48
PLEUROZIUM SCHREBERI	13
LEDUM GROENLANDICUM	8
ELYMUS INNOVATUS	5
PICEA ENGELMANNII	5
SHEPHERDIA CANADENSIS	5
ABIES LASIOCARPA	4
PINUS CONTORTA	4
LINNAEA BOREALIS	4
PHYLLODOCE GLANDULIFLORA	3
PICEA GLAUCA	3
PICEA ENGELMANNII X GLAUCA	3
SALIX VESTITA	3
VACCINIUM VITIS-IDAEA	3
SALIX GLAUCA	2

Variable	Mean	Min	Max
NatSubR	7.9	7.0	8.0
Drainage	3.3	2.0	5.0
Moisture	5.0	2.0	7.0
Elevation	1708.5	1220.0	4710.0
Aspect	162.9	0.0	315.0
Slope	24.0	1.0	73.0

ESIS Plot #	Location (lat/long)					
17SR3693	52°	9'	0" N	115°	26'	0" W
34PS1601	53°	29'	0" N	118°	12'	0" W
94AW5149	51°	9'	13" N	115°	37'	16" W
94JC8040	51°	30'	34" N	115°	55'	38" W
94JD6071	50°	59'	49" N	115°	28'	5" W
94JE8073	51°	32'	7" N	115°	58'	46" W
94JI5092	52°	42'	30" N	118°	9'	39" W
94JI5117	52°	46'	32" N	118°	2'	58" W

94JI8040	52°	37'	49" N	117°	3'	32" W
94JI8070	52°	50'	36" N	117°	24'	54" W
94JI9026	53°	20'	55" N	118°	27'	10" W
94JI9071	53°	11'	33" N	118°	18'	7" W
94JI9076	53°	12'	52" N	118°	16'	14" W
94JI9077	53°	12'	26" N	118°	16'	19" W
94JM8075	52°	57'	36" N	117°	41'	45" W
94PA7045	51°	57'	48" N	116°	40'	16" W
94PA7109	51°	47'	51" N	116°	34'	40" W
94PA9008	53°	19'	39" N	118°	21'	42" W
94SJ7046	52°	52'	9" N	117°	49'	4" W
94SJ8032	52°	28'	30" N	117°	3'	6" W
94SJ8099	52°	34'	21" N	118°	3'	45" W
94SJ9010	53°	24'	46" N	118°	19'	23" W
94SJ9011	53°	26'	3" N	118°	20'	26" W
94SJ9016	53°	21'	14" N	118°	15'	46" W
94SJ9018	53°	18'	21" N	118°	17'	34" W
94SJ9019	53°	18'	48" N	118°	17'	17" W
94SJ9027	53°	19'	40" N	118°	25'	6" W
94SJ9028	53°	21'	12" N	118°	24'	55" W
94SJ9033	53°	21'	55" N	118°	24'	5" W
94SJ9102	53°	9'	46" N	119°	6'	36" W

Notes
Mosses dominant, may be more properly a moss/lichen community type.

Pinus contorta / Shepherdia canadensis – Linnaea borealis / Elymus innovatus / Pleurozium schreberi

Group as4
N = 17

Species	Cover
PINUS CONTORTA	19
SHEPHERDIA CANADENSIS	9
PLEUROZIUM SCHREBERI	9
LINNAEA BOREALIS	6
ELYMUS INNOVATUS	5
VACCINIUM SCOPARIUM	5
JUNIPERUS COMMUNIS	5
VACCINIUM MEMBRANACEUM	3
CLADINA MITIS	3
PTILIUM CRISTA-CASTRENSIS	3
VACCINIUM VITIS-IDAEA	3
HYLOCOMIUM SPLENDENS	3
LEDUM GROENLANDICUM	3
VACCINIUM CAESPITOSUM	3
ARCTOSTAPHYLOS UVA-URSI	2
ARNICA CORDIFOLIA	2
VACCINIUM MYRTILLOIDES	2

Variable	Mean	Min	Max
NatSubR	8.0	8.0	8.0
Drainage	2.8	2.0	4.0
Moisture	4.9	3.0	7.0
Elevation	1592.9	1310.0	2040.0
Aspect	163.9	0.0	270.0
Slope	21.1	0.0	55.0

ESIS Plot #	Location (lat/long)					
24SD0205	54°	25'	0" N	119°	10'	0" W
37BF1002	53°	54'	0" N	118°	18'	0" W
94AW5027	51°	18'	22" N	115°	48'	0" W
94AW6001	51°	13'	25" N	115°	49'	17" W
94JC7019	52°	51'	42" N	118°	21'	49" W

94JC8007	51°	16'	30" N	115°	37'	39"	W
94JE9124	53°	6'	40" N	118°	30'	9"	W
94JE9125	53°	7'	7" N	118°	29'	52"	W
94JI9039	53°	19'	34" N	118°	34'	6"	W
94JI9045	53°	21'	19" N	118°	39'	45"	W
94JI9104	53°	21'	9" N	119°	15'	28"	W
94JM7024	52°	54'	45" N	118°	28'	23"	W
94LC9111	53°	18'	46" N	119°	14'	36"	W
94SJ8027	53°	6'	46" N	117°	40'	53"	W
94SJ8102	52°	48'	31" N	117°	40'	54"	W
94SJ9034	53°	21'	4" N	118°	21'	39"	W
94SJ9049	53°	21'	36" N	118°	46'	27"	W

Notes

Salix spp. – Betula glandulosa / Carex aquatilis / Sphagnum warnstorfii – Tomenthypnum nitens

Group as5
N = 9

Species	Cover
SPHAGNUM WARNSTORFII	52
TOMENTHYPNUM NITENS	24
CAREX AQUATILIS	17
BETULA GLANDULOSA	8
AULACOMNIUM PALUSTRE	5
SALIX BARRATTIANA	5
BETULA PUMILA	4
EQUISETUM ARVENSE	4
SALIX MYRTILLIFOLIA	3
SALIX PEDICELLARIS	2
SALIX GLAUCA	2
CAREX GYNOCRATES	2

Variable	Mean	Min	Max
NatSubR	8.0	8.0	8.0
Drainage	6.3	5.0	7.0
Moisture	7.6	6.0	9.0
Elevation	1586.1	1320.0	1890.0
Aspect	252.0	80.0	315.0
Slope	1.6	0.0	6.0

ESIS Plot #	Location (lat/long)					
31GP4585	54°	26'	0" N	119°	22'	0" W
31GP4586	54°	26'	0" N	119°	22'	0" W
31GP7483	54°	10'	0" N	119°	3'	0" W
31GP7489	54°	10'	0" N	119°	3'	0" W
31GP7499	54°	5'	0" N	119°	48'	0" W
37YH1243	53°	49'	0" N	118°	18'	0" W
94JI5032	52°	45'	2" N	118°	7'	50" W
94JI9138	53°	0'	27" N	118°	29'	1" W
94SJ9134	53°	3'	20" N	118°	45'	38" W

Salix barrattiana – Salix glauca / Trollius albiflorus / Aulacomnium palustre – Tomenthypnum nitens

Group as7
N = 41

Species	Cover
SALIX BARRATTIANA	43
SALIX GLAUCA	8
AULACOMNIUM PALUSTRE	7
TROLLIUS ALBIFLORUS	6
TOMENTHYPNUM NITENS	6
ARTEMISIA NORVEGICA	3
FRAGARIA VIRGINIANA	3
DRYAS OCTOPETALA	2
BETULA GLANDULOSA	2
ERIGERON PEREGRINUS	2
VALERIANA SITCHENSIS	2
ELYMUS INNOVATUS	2

Variable	Mean	Min	Max
NatSubR	7.4	7.0	8.0
Drainage	4.8	3.0	7.0
Moisture	6.4	5.0	9.0
Elevation	2071.2	1590.0	2320.0
Aspect	171.4	0.0	315.0
Slope	15.4	0.0	55.0

ESIS Plot #	Location (lat/long)					
31GP7472	54°	10'	0" N	119°	21'	0" W
31GP8638	54°	0'	0" N	119°	47'	0" W
94IC6019	52°	4'	52" N	116°	53'	3" W
94IC6021	52°	5'	19" N	116°	53'	33" W
94JC6030	52°	12'	23" N	117°	5'	30" W
94JD5046	51°	27'	42" N	116°	0'	57" W
94JD5051	51°	29'	25" N	116°	1'	46" W
94JD5054	51°	29'	7" N	116°	0'	54" W
94JD7053	52°	3'	26" N	116°	47'	25" W
94JE8033	51°	54'	22" N	116°	5'	44" W

94JE8056	51°	34'	4" N	115°	51'	18" W
94JE8085	51°	31'	21" N	115°	54'	25" W
94JE9033	53°	25'	28" N	118°	45'	51" W
94JE9036	53°	24'	55" N	118°	44'	5" W
94JE9042	53°	25'	50" N	118°	55'	28" W
94JE9061	53°	0'	24" N	118°	22'	44" W
94JE9183	52°	26'	10" N	117°	17'	25" W
94JI5061	52°	42'	6" N	118°	0'	45" W
94JI6051	52°	31'	45" N	117°	15'	14" W
94JI7066	52°	43'	27" N	118°	12'	55" W
94JI8042	52°	41'	31" N	117°	17'	31" W
94JI9062	53°	11'	7" N	118°	21'	57" W
94JM7062	52°	35'	27" N	117°	34'	21" W
94JM8011	52°	36'	48" N	116°	57'	36" W
94JM8036	52°	42'	56" N	117°	9'	28" W
94JM8038	52°	43'	7" N	117°	10'	1" W
94JM8044	52°	46'	54" N	117°	13'	36" W
94LC9046	53°	22'	0" N	118°	58'	50" W
94LC9082	53°	16'	35" N	118°	22'	56" W
94LC9084	53°	15'	48" N	118°	22'	34" W
94LC9130	53°	12'	12" N	118°	33'	19" W
94PA7024	51°	37'	47" N	116°	14'	26" W
94PA7133	51°	43'	7" N	116°	15'	43" W
94PA8019	51°	43'	50" N	116°	12'	31" W
94PA8080	51°	42'	52" N	115°	53'	16" W
94PA9112	52°	45'	39" N	117°	36'	47" W
94SJ7039	52°	44'	51" N	117°	36'	2" W
94SJ7057	52°	51'	12" N	117°	54'	55" W
94SJ9014	53°	22'	17" N	118°	13'	3" W
94SJ9130	52°	51'	53" N	117°	57'	40" W
D4JD8037	51°	39'	30" N	116°	1'	25" W

Notes

Salix glauca – Salix barrattiana – Betula glandulosa / Fragaria virginiana
Group as8
N = 38

Species	Cover
SALIX GLAUCA	44
BETULA GLANDULOSA	7
FRAGARIA VIRGINIANA	7
SALIX BARRATTIANA	7
DANTHONIA CALIFORNICA	4
AULACOMNIUM PALUSTRE	3
SALIX FARRIAE	3
EQUISETUM SCIRPOIDES	3
ERIGERON PEREGRINUS	3
CAREX SPP.	3
POTENTILLA FRUTICOSA	2
POLYTRICHUM JUNIPERINUM	2
VALERIANA SITCHENSIS	2

Variable	Mean	Min	Max
NatSubR	7.6	7.0	8.0
Drainage	4.3	3.0	6.0
Moisture	5.7	3.0	9.0
Elevation	1951.2	1350.0	2340.0
Aspect	149.5	0.0	315.0
Slope	11.2	0.0	70.0

ESIS Plot #	Location (lat/long)					
31GP7474	54°	5'	0" N	119°	39'	0" W
34CB2459	52°	51'	0" N	117°	3'	0" W
57WCA028	52°	58'	0" N	117°	19'	0" W
94AW6064	51°	4'	1" N	115°	38'	48" W
94AW6098	50°	46'	42" N	115°	25'	31" W
94BK6087	50°	56'	52" N	115°	32'	56" W
94BK6088	50°	54'	21" N	115°	32'	46" W
94IC8080	51°	24'	55" N	115°	42'	45" W
94JC8056	51°	31'	54" N	116°	1'	49" W
94JD5052	51°	29'	18" N	116°	0'	54" W

94JD5072	51°	33'	10" N	116°	18'	54" W
94JD6063	50°	56'	14" N	115°	28'	59" W
94JD7054	52°	3'	37" N	116°	48'	36" W
94JE8049	51°	45'	57" N	115°	57'	23" W
94JE8060	51°	34'	25" N	115°	56'	38" W
94JE8094	51°	31'	1" N	115°	49'	58" W
94JE9023	53°	24'	10" N	118°	40'	0" W
94JE9028	53°	27'	21" N	118°	41'	43" W
94JE9047	53°	25'	8" N	118°	53'	31" W
94JE9113	53°	18'	47" N	119°	5'	2" W
94JI8023	52°	42'	36" N	117°	6'	3" W
94LC9041	53°	23'	47" N	118°	33'	34" W
94PA7178	51°	24'	37" N	115°	51'	25" W
94PA8005	51°	20'	49" N	115°	43'	38" W
94PA8130	51°	29'	35" N	115°	39'	45" W
94PA8147	51°	25'	19" N	115°	40'	49" W
94PA9080	53°	11'	17" N	118°	37'	51" W
94SJ8036	52°	31'	28" N	117°	4'	37" W
94SJ9044	53°	20'	32" N	118°	48'	51" W
94SJ9048	53°	21'	3" N	118°	47'	6" W
94SJ9052	53°	22'	28" N	118°	46'	37" W
94SJ9057	53°	22'	58" N	118°	46'	51" W
D4JD7140	51°	27'	46" N	115°	48'	5" W
D4JD8005	51°	13'	42" N	115°	40'	13" W
D4JD8031	51°	42'	56" N	116°	4'	57" W
D4JD8113	51°	29'	47" N	115°	45'	49" W
D4JD9078	51°	30'	28" N	116°	1'	0" W
D4JD9087	51°	20'	54" N	116°	14'	37" W

Notes

Salix barrattiana – Salix glauca – Betula glandulosa / Carex aquatilis / Aulacomnium palustre – Tomenthypnum nitens

Group as9

N = 15

Species	Cover
CAREX AQUATILIS	48
SALIX BARRATTIANA	19
AULACOMNIUM PALUSTRE	11
TOMENTHYPNUM NITENS	10
SALIX GLAUCA	6
BETULA GLANDULOSA	5
SPHAGNUM WARNSTORFII	5
POTENTILLA FRUTICOSA	4
DREPANOCLADUS REVOLVENS	3
SALIX FARRIAE	3
SPHAGNUM FUSCUM	3
ARCTOSTAPHYLOS RUBRA	2
BRYUM PSEUDOTRIQUETRUM	2
SALIX BRACHYCARPA	2
DREPANOCLADUS SPP.	2
PICEA ENGELMANNII	2

Variable	Mean	Min	Max
NatSubR	7.8	7.0	8.0
Drainage	6.3	6.0	7.0
Moisture	7.7	6.0	9.0
Elevation	1782.7	1360.0	2360.0
Aspect	123.9	0.0	315.0
Slope	2.9	0.0	8.0

ESIS Plot #	Location (lat/long)					
31GP7478	54°	5'	0" N	119°	48'	0" W
94AW5017	51°	15'	9" N	115°	57'	57" W
94AW5038	51°	18'	47" N	115°	54'	58" W
94AW5059	51°	24'	24" N	116°	3'	54" W
94JC8070	51°	34'	55" N	115°	48'	54" W
94JD5048	51°	27'	58" N	116°	0'	5" W

94JD6062	51°	7'	21" N	115°	35'	30" W
94JD7027	51°	58'	43" N	116°	55'	27" W
94JE8076	51°	33'	45" N	115°	58'	35" W
94JE8140	51°	36'	1" N	115°	49'	54" W
94JE9108	53°	15'	0" N	118°	49'	36" W
94JE9160	52°	25'	36" N	117°	16'	32" W
94JI9001	53°	24'	41" N	118°	28'	49" W
94PA8095	51°	31'	39" N	115°	45'	1" W
94SJ9029	53°	21'	22" N	118°	24'	54" W

Notes

Salix reticulata – Salix arctica / Potentilla diversifolia
Group as10
N = 7

Species	Cover
SALIX RETICULATA	33
POTENTILLA DIVERSIFOLIA	7
SALIX ARCTICA	5
TORTULA RURALIS	4
CERATODON PURPUREUS	3
POLYGONUM VIVIPARUM	3
ABIES LASIOCARPA	3
PHYLLODOCE GLANDULIFLORA	3
LUZULA SPICATA	2
DRYAS OCTOPETALA	2

Variable	Mean	Min	Max
NatSubR	7.1	7.0	8.0
Drainage	2.6	2.0	3.0
Moisture	4.9	2.0	6.0
Elevation	2261.4	2000.0	2650.0
Aspect	194.9	45.0	315.0
Slope	21.4	5.0	40.0

ESIS Plot #	Location (lat/long)					
31GP7480	54°	0'	0" N	119°	47'	0" W
94JE8123	51°	37'	8" N	115°	48'	35" W
94JE8124	51°	26'	14" N	115°	37'	52" W
94JM8039	52°	43'	39" N	117°	9'	17" W
94JM8047	52°	40'	57" N	117°	13'	40" W
94PA8067	51°	44'	19" N	115°	56'	24" W
94SJ9118	53°	13'	13" N	119°	1'	46" W

Notes

Betula glandulosa – Salix myrtillifolia / Carex spp. / Tomenthypnum nitens – Sphagnum spp.

Group as12
N = 14

Species	Cover
BETULA GLANDULOSA	27
TOMENTHYPNUM NITENS	21
AULACOMNIUM PALUSTRE	14
SALIX MYRTILLIFOLIA	13
CAREX SPP.	11
CAREX AQUATILIS	11
SPHAGNUM ANGUSTIFOLIUM	8
SPHAGNUM WARNSTORFII	7
LARIX LARICINA	5
DESCHAMPSIA CESPITOSA	4
SALIX BARRATTIANA	3
PICEA MARIANA	3
SALIX ATHABASCENSIS	3
SPHAGNUM CAP.	3
POTENTILLA FRUTICOSA	2

Variable	Mean	Min	Max
NatSubR	7.9	7.0	8.0
Drainage	6.1	5.0	7.0
Moisture	7.5	6.0	9.0
Elevation	1563.6	1235.0	2140.0
Aspect	202.4	45.0	315.0
Slope	9.8	0.0	100.0

ESIS Plot #	Location (lat/long)					
31GP7486	54°	10'	0" N	119°	3'	0" W
31GP7494	54°	5'	0" N	118°	18'	0" W
31GP7496	54°	5'	0" N	118°	18'	0" W
32GP6113	54°	4'	35" N	118°	24'	30" W
34CB2470	52°	51'	0" N	116°	54'	0" W
57WCA031	52°	51'	0" N	116°	50'	0" W
94AW7103	51°	48'	25" N	116°	24'	42" W

94JC8050	51°	31'	9" N	116°	0'	6" W
94JE9091	53°	15'	58" N	118°	52'	35" W
94JI9010	53°	21'	58" N	118°	24'	0" W
94JI9013	53°	18'	5" N	118°	16'	10" W
94PA8031	51°	47'	37" N	116°	9'	19" W
94SJ9007	53°	23'	8" N	118°	21'	19" W
D4JD7118	51°	34'	1" N	116°	7'	16" W

Notes

Betula glandulosa – Arctostaphylos uva-ursi – Salix glauca / Elymus innovatus
Group as18
N = 36

Species	Cover
BETULA GLANDULOSA	45
ARCTOSTAPHYLOS UVA-URSI	8
ELYMUS INNOVATUS	7
SALIX GLAUCA	7
KOBRESIA MYOSUROIDES	4
POTENTILLA FRUTICOSA	3
SPHAGNUM ANGUSTIFOLIUM	3

Variable	Mean	Min	Max
NatSubR	7.8	7.0	8.0
Drainage	4.2	2.0	6.0
Moisture	5.1	2.0	9.0
Elevation	1816.9	1220.0	2300.0
Aspect	133.1	0.0	315.0
Slope	13.7	0.0	55.0

ESIS Plot #	Location (lat/long)					
31GP8512	54°	20'	0" N	119°	21'	0" W
32RC0030	52°	4'	0" N	116°	0'	0" W
32RC0032	52°	4'	0" N	116°	0'	0" W
32RC0035	52°	4'	0" N	116°	0'	0" W
94JC8020	51°	49'	36" N	116°	3'	49" W
94JC8068	51°	35'	26" N	115°	47'	36" W
94JD6081	51°	0'	55" N	115°	34'	25" W
94JD7020	51°	57'	45" N	116°	58'	15" W
94JD9005	53°	21'	24" N	118°	30'	3" W
94JD9009	53°	21'	27" N	118°	28'	14" W
94JD9049	53°	6'	58" N	118°	19'	14" W
94JD9065	53°	16'	24" N	118°	47'	14" W
94JE8148	51°	35'	58" N	115°	47'	0" W
94JE9029	53°	27'	29" N	118°	41'	25" W
94JI5060	52°	42'	39" N	118°	0'	31" W
94JI6048	52°	18'	13" N	117°	2'	33" W

94JI6058	52°	22'	38" N	117°	6'	5" W
94JI8071	52°	50'	52" N	117°	25'	1" W
94JI9022	53°	16'	42" N	118°	25'	6" W
94JM8055	52°	37'	37" N	117°	7'	35" W
94LC9055	53°	24'	37" N	118°	57'	49" W
94LC9128	53°	12'	46" N	118°	32'	51" W
94LC9154	53°	17'	7" N	118°	36'	13" W
94PA8070	51°	43'	42" N	115°	56'	1" W
94PA8078	51°	43'	36" N	115°	54'	42" W
94PA9013	53°	21'	30" N	118°	19'	49" W
94PA9120	52°	38'	4" N	117°	9'	48" W
94PA9124	52°	37'	5" N	118°	0'	0" W
94SJ8037	52°	30'	14" N	117°	3'	4" W
94SJ8052	52°	45'	8" N	117°	26'	54" W
94SJ8056	52°	49'	59" N	117°	22'	35" W
94SJ9077	53°	24'	36" N	119°	7'	30" W
D4JD8070	51°	43'	30" N	115°	49'	33" W
D4JD8088	51°	39'	11" N	115°	47'	25" W
D4JD8097	51°	32'	9" N	115°	42'	57" W
D4JD8101	51°	32'	25" N	115°	43'	5" W

Notes

Salix glauca – Betula glandulosa
Group as20
N = 26

Species	Cover
SALIX GLAUCA	16
BETULA GLANDULOSA	6
ELYMUS INNOVATUS	4
ARCTOSTAPHYLOS UVA-URSI	4
ABIES LASIOCARPA	3
SALIX BARRATTIANA	3
CAREX ROSTRATA	3
CLADONIA PYXIDATA	3
PICEA ENGELMANNII	3
POTENTILLA FRUTICOSA	2
JUNIPERUS COMMUNIS	2

Variable	Mean	Min	Max
NatSubR	7.7	7.0	8.0
Drainage	3.7	2.0	6.0
Moisture	4.8	2.0	7.0
Elevation	1923.1	1400.0	2400.0
Aspect	173.9	0.0	315.0
Slope	24.4	0.0	57.0

ESIS Plot #	Location (lat/long)					
31GP8633	54°	0'	0" N	119°	47'	0" W
94AW5034	51°	18'	28" N	115°	55'	23" W
94AW6106	50°	55'	10" N	115°	32'	52" W
94AW7090	51°	48'	4" N	116°	25'	18" W
94AW7099	51°	46'	43" N	116°	25'	10" W
94JC6052	52°	31'	3" N	117°	15'	21" W
94JD5126	51°	14'	12" N	115°	40'	46" W
94JD7086	51°	48'	34" N	116°	23'	30" W
94JE8050	51°	45'	13" N	115°	55'	47" W
94JE8102	51°	37'	13" N	115°	42'	43" W
94JE8156	51°	5'	18" N	115°	45'	28" W
94JE9120	53°	7'	34" N	118°	33'	54" W

94JI5026	52°	44'	51" N	118°	7'	55" W
94JI9096	53°	26'	8" N	119°	18'	33" W
94LC9074	53°	10'	57" N	118°	26'	23" W
94LC9075	53°	10'	11" N	118°	26'	8" W
94LC9076	53°	10'	3" N	118°	26'	3" W
94LC9081	53°	16'	51" N	118°	23'	6" W
94PA7053	51°	55'	29" N	116°	44'	15" W
94PA8039	51°	50'	19" N	115°	57'	3" W
94PA8062	51°	36'	6" N	115°	56'	17" W
94PA8154	51°	28'	12" N	116°	5'	34" W
94SJ8029	53°	5'	24" N	117°	42'	51" W
94SJ8044	52°	37'	30" N	117°	8'	46" W
94SJ9106	53°	10'	48" N	119°	6'	57" W
D4JD7133	51°	27'	33" N	115°	50'	34" W

Notes

Arctostaphylos uva-ursi – Juniperus communis / Elymus innovatus
Group as22
N = 51

Species	Cover
ARCTOSTAPHYLOS UVA-URSI	33
ELYMUS INNOVATUS	8
JUNIPERUS COMMUNIS	7
SHEPHERDIA CANADENSIS	3
POTENTILLA FRUTICOSA	3
HEDYSARUM SULPHURESCENS	3
PINUS CONTORTA	3
PICEA ENGELMANNII	2

Variable	Mean	Min	Max
NatSubR	7.8	7.0	8.0
Drainage	2.4	2.0	3.0
Moisture	3.3	2.0	5.0
Elevation	1904.6	1200.0	2470.0
Aspect	192.2	90.0	270.0
Slope	53.8	1.0	85.0

ESIS Plot #	Location (lat/long)					
32CC0074	51°	59'	0" N	116°	26'	0" W
32CC0077	51°	59'	0" N	116°	26'	0" W
32RC0029	52°	4'	0" N	116°	0'	0" W
34KP0011	52°	3'	0" N	116°	33'	0" W
34YA1002	51°	6'	0" N	115°	14'	0" W
57WCA029	52°	58'	0" N	117°	19'	0" W
94AW5026	51°	18'	35" N	115°	48'	25" W
94AW7015	51°	16'	58" N	115°	25'	40" W
94AW7051	51°	49'	8" N	116°	45'	29" W
94IC6041	52°	11'	45" N	117°	7'	57" W
94JC6044	52°	16'	1" N	117°	5'	36" W
94JC6049	52°	19'	12" N	117°	3'	25" W
94JC6079	52°	13'	21" N	117°	12'	22" W
94JC8023	51°	45'	56" N	116°	3'	4" W
94JD5069	51°	18'	55" N	115°	58'	15" W

94JE8012	51°	21'	38" N	115°	35'	4"	W
94JE8020	51°	33'	14" N	115°	34'	47"	W
94JE8029	51°	51'	39" N	116°	2'	43"	W
94JE8037	51°	48'	28" N	115°	58'	28"	W
94JE8051	51°	45'	45" N	115°	56'	12"	W
94JE8128	51°	23'	58" N	115°	35'	16"	W
94JE8137	51°	33'	9" N	115°	43'	57"	W
94JI7002	53°	13'	16" N	117°	48'	55"	W
94JI8025	52°	42'	3" N	117°	5'	1"	W
94JI8033	52°	39'	7" N	117°	1'	30"	W
94JI8036	52°	39'	42" N	116°	58'	46"	W
94JM7045	52°	36'	16" N	117°	24'	13"	W
94JM8006	53°	7'	19" N	117°	42'	57"	W
94JM8007	53°	7'	45" N	117°	44'	57"	W
94JM8025	53°	8'	16" N	117°	45'	28"	W
94JM8068	52°	51'	59" N	117°	25'	19"	W
94LC9021	53°	16'	19" N	118°	10'	9"	W
94LC9029	53°	25'	46" N	118°	30'	4"	W
94LC9043	53°	24'	42" N	118°	33'	9"	W
94LC9139	53°	14'	56" N	118°	27'	39"	W
94LC9183	52°	22'	1" N	117°	20'	52"	W
94PA7041	51°	15'	53" N	115°	20'	11"	W
94PA7043	51°	16'	30" N	115°	20'	51"	W
94PA7061	51°	51'	43" N	116°	38'	8"	W
94PA8014	51°	40'	32" N	115°	48'	48"	W
94PA8036	51°	49'	9" N	115°	57'	30"	W
94PA8043	51°	50'	15" N	115°	58'	58"	W
94PA8048	51°	37'	20" N	116°	0'	19"	W
94PA8085	51°	28'	48" N	115°	51'	38"	W
94SJ8002	53°	3'	16" N	118°	0'	22"	W
94SJ8104	52°	52'	43" N	117°	49'	49"	W
94SJ9026	53°	19'	36" N	118°	24'	3"	W
94SJ9055	53°	23'	21" N	118°	46'	9"	W
D4JD7149	51°	24'	10" N	115°	46'	55"	W
D4JD8074	51°	42'	18" N	115°	46'	27"	W
D4JD9075	51°	40'	52" N	115°	49'	1"	W

Notes

Salix spp. – Betula glandulosa / Carex spp. / Aulacomnium palustre
Group 31
N = 11

Species	Cover
SALIX SPP.	47
BETULA GLANDULOSA	16
AULACOMNIUM PALUSTRE	5
CAREX AQUATILIS	4
CAREX SPP.	4
BRYUM PSEUDOTRIQUETRUM	3
POTENTILLA FRUTICOSA	3
CAREX ROSTRATA	2
HEDYSARUM BOREALE	2

Variable	Mean	Min	Max
NatSubR	7.6	7.0	8.0
Drainage	4.8	3.0	6.0
Moisture	7.1	4.0	9.0
Elevation	1867.3	1230.0	2120.0
Aspect	130.7	0.0	340.0
Slope	6.7	0.0	35.0

ESIS Plot #	Location (lat/long)					
32RC00H5	51°	59'	0" N	116°	0'	0" W
32RC00H9	51°	59'	0" N	116°	0'	0" W
32RC0H13	51°	54'	0" N	116°	8'	0" W
32RC0H14	51°	54'	0" N	116°	8'	0" W
34GP0125	53°	54'	0" N	119°	38'	0" W
34RDP003	°	'	" N	°	'	" W
34RDP011	°	'	" N	°	'	" W
37BF1055	53°	54'	0" N	118°	18'	0" W
94AW7009	51°	33'	10" N	116°	9'	55" W
94AW7028	51°	44'	21" N	116°	32'	5" W
94JI7050	52°	35'	40" N	117°	27'	3" W

Notes

Salix myrtillifolia / Carex aquatilis – Calamagrostis stricta / Aulacomnium palustre – Sphagnum warnstorfii

Group as57

N = 5

Species	Cover
SALIX MYRTILLIFOLIA	53
CAREX AQUATILIS	15
AULACOMNIUM PALUSTRE	13
SPHAGNUM WARNSTORFII	13
CALAMAGROSTIS STRICTA	10
DREPANOCLADUS REVOLVENS	6
BRYUM PSEUDOTRIQUETRUM	5
CALAMAGROSTIS CANADENSIS	5
EQUISETUM ARVENSE	5
CLIMACIUM DENDROIDES	3
SALIX DRUMMONDIANA	3
TOMENTHYPNUM NITENS	3
GEUM ALEPPICUM	2
SALIX GLAUCA	2

Variable	Mean	Min	Max
NatSubR	8.0	8.0	8.0
Drainage	6.0	6.0	6.0
Moisture	8.0	6.0	9.0
Elevation	1385.0	1260.0	1580.0
Aspect	145.0	130.0	160.0
Slope	1.2	0.0	3.0

ESIS Plot #	Location (lat/long)	
37BF1034	53° 49' 0" N	118° 27' 0" W
57WCA012	53° 48' 0" N	118° 25' 0" W
94JD9008	53° 20' 4" N	118° 29' 40" W
94LC9009	53° 18' 36" N	118° 4' 18" W
94LC9099	53° 13' 47" N	119° 16' 7" W

Notes

Salix drummondiana – Betula glandulosa – Ledum groenlandicum / Carex aquatilis / Sphagnum spp.

Group as60

N = 4

Species	Cover
SPHAGNUM ANGUSTIFOLIUM	21
SALIX DRUMMONDIANA	19
SPHAGNUM FUSCUM	18
BETULA GLANDULOSA	7
CAREX AQUATILIS	6
LEDUM GROENLANDICUM	6
LARIX LARICINA	5
PICEA MARIANA	5
AULACOMNIUM PALUSTRE	4
BRACYTHECIUM GROENLANDICUM	4
PINUS CONTORTA	3
SALIX MYRTILLIFOLIA	3
AGROPYRON TRACHYCAULUM	3
HYLOCOMIUM SPLENDENS	3
SCIRPUS CESPITOSUS	3
CAREX VAGINATA	2

Variable	Mean	Min	Max
NatSubR	8.0	8.0	8.0
Drainage	6.3	5.0	7.0
Moisture	7.8	7.0	9.0
Elevation	1435.0	1330.0	1600.0
Aspect	150.3	46.0	315.0
Slope	3.0	0.0	5.0

ESIS Plot #	Location (lat/long)					
37BF1123	54°	0'	0" N	118°	9'	0" W
37BF1141	53°	49'	0" N	118°	27'	0" W
94JI9027	53°	20'	23" N	118°	27'	51" W
94PA7052	51°	55'	1" N	116°	43'	31" W

Notes

Salix spp. – Betula glandulosa / Stipa spp. / Thuidium abietinum
Group as62
N = 4

Species	Cover
THUIDIUM ABIETINUM	35
SALIX MYRTILLIFOLIA	15
SALIX BEBBIANA	13
DANTHONIA CALIFORNICA	10
STIPA COLUMBIANA	10
STIPA RICHARDSONII	10
AGROPYRON TRACHYCAULUM	5
BETULA GLANDULOSA	5
SALIX BRACHYCARPA	5
FRAGARIA VIRGINIANA	5
ELYMUS INNOVATUS	4
EPILOBIUM ANGUSTIFOLIUM	4
POLYTRICHUM JUNIPERINUM	4
TORTULA RURALIS	4
TRISETUM SPICATUM	3
FESTUCA SAXIMONTANA	3
FESTUCA SPP.	3
HYLOCOMIUM SPLENDENS	3
PHLEUM COMMUTATUM	3
THALICTRUM VENULOSUM	2
VALERIANA DIOICA	2

Variable	Mean	Min	Max
NatSubR	8.0	8.0	8.0
Drainage	2.8	2.0	3.0
Moisture	4.3	3.0	5.0
Elevation	1555.0	1420.0	1720.0
Aspect	210.0	180.0	225.0
Slope	16.3	0.0	30.0

ESIS Plot #	Location (lat/long)
37YH1136	53° 29' 0" N 118° 13' 0" W
94JD9007	53° 21' 6" N 118° 31' 44" W

94LC9033	53°	25'	40" N	118°	30'	42" W
94LC9042	53°	24'	31" N	118°	33'	9" W

Notes

Salix arctica / Aulacomnium palustre

Group as63

N = 25

Species	Cover
SALIX ARCTICA	30
AULACOMNIUM PALUSTRE	6
CASSIOPE TETRAGONA	4
TOMENTHYPNUM NITENS	4
HYLOCOMIUM SPLENDENS	3
SALIX RETICULATA	3
ARTEMISIA NORVEGICA	3
POLYTRICHUM JUNIPERINUM	3
PHILONOTIS FONTANA	2
EQUISETUM VARIEGATUM	2

Variable	Mean	Min	Max
NatSubR	7.3	7.0	8.0
Drainage	4.3	3.0	7.0
Moisture	5.7	3.0	9.0
Elevation	2244.2	1980.0	2610.0
Aspect	109.8	0.0	340.0
Slope	22.7	0.0	60.0

ESIS Plot #	Location (lat/long)					
37YH1231	53°	25'	0" N	118°	12'	0" W
94AW5092	51°	28'	40" N	116°	3'	10" W
94AW7044	51°	46'	56" N	116°	49'	10" W
94BK6074	51°	42'	13" N	116°	22'	54" W
94BK6075	51°	41'	4" N	116°	23'	14" W
94IC6105	52°	4'	6" N	117°	12'	0" W
94JD5100	51°	25'	36" N	115°	57'	52" W
94JD7015	51°	57'	55" N	117°	0'	9" W
94JD9070	52°	58'	13" N	118°	27'	46" W
94JD9071	52°	57'	27" N	118°	27'	7" W
94JE8035	51°	47'	40" N	115°	59'	22" W
94JE9064	52°	57'	52" N	118°	22'	8" W
94JE9173	53°	5'	1" N	118°	11'	31" W

94JI5068	52°	56'	39" N	118°	9'	54" W
94JI8055	52°	53'	10" N	117°	42'	9" W
94JI9066	53°	13'	35" N	118°	19'	38" W
94JM7091	52°	56'	47" N	118°	22'	28" W
94LC9083	53°	16'	28" N	118°	22'	20" W
94LC9174	52°	44'	7" N	117°	24'	10" W
94LC9175	52°	44'	21" N	117°	24'	52" W
94PA7122	51°	42'	43" N	116°	16'	21" W
94PA7166	51°	30'	12" N	116°	7'	40" W
94PA8004	51°	19'	48" N	115°	46'	58" W
94PA8071	51°	44'	8" N	115°	55'	58" W
94PA9121	52°	48'	50" N	117°	38'	24" W

Notes

Pinus contorta – Picea engelmannii / Menziesia ferruginea – Shepherdia canadensis / Elymus innovatus / Pleurozium schreberi – Hylocomium splendens

Group 73
N = 13

Species	Cover
PLEUROZIUM SCHREBERI	51
HYLOCOMIUM SPLENDENS	18
MENZIESIA FERRUGINEA	17
PINUS CONTORTA	9
PICEA ENGELMANNII	8
ELYMUS INNOVATUS	5
SHEPHERDIA CANADENSIS	5
ABIES LASIOCARPA	4
VACCINIUM SCOPARIUM	4
DICRANUM BREVIFOLIUM	4
VACCINIUM MEMBRANACEUM	4
SALIX VESTITA	3
LINNAEA BOREALIS	3
PHYLLODOCE GLANDULIFLORA	2
PTILIUM CRISTA-CASTRENSIS	2
RHODODENDRON ALBIFLORUM	2
CORNUS CANADENSIS	2

Variable	Mean	Min	Max
NatSubR	7.8	7.0	8.0
Drainage	3.6	3.0	5.0
Moisture	5.2	5.0	6.0
Elevation	1763.1	1490.0	2100.0
Aspect	210.0	0.0	315.0
Slope	21.1	3.0	50.0

ESIS Plot #	Location (lat/long)					
94AW5002	51°	22'	25" N	116°	6'	30" W
94AW5012	51°	15'	24" N	116°	0'	27" W
94JD6082	51°	1'	33" N	115°	34'	16" W
94JE8101	51°	36'	51" N	115°	42'	17" W
94JI5024	52°	46'	40" N	118°	4'	6" W

94JI5031	52°	45'	57" N	118°	7'	37" W
94JI5057	53°	7'	55" N	118°	8'	43" W
94JI5076	52°	32'	58" N	117°	49'	10" W
94JI9003	53°	24'	50" N	118°	28'	30" W
94JI9016	53°	20'	21" N	118°	17'	10" W
94JM7020	52°	48'	24" N	117°	42'	8" W
94JM7035	52°	43'	5" N	117°	42'	2" W
94JM8046	52°	44'	19" N	117°	9'	44" W

Notes

Salix spp. – Potentilla fruticosa – Betula glandulosa / Carex spp. / Aulacomnium palustre

Group as76
N = 10

Species	Cover
SALIX GLAUCA	18
POTENTILLA FRUTICOSA	18
AULACOMNIUM PALUSTRE	16
CAREX NORVEGICA	10
BETULA GLANDULOSA	8
CAREX BUXBAUMII	7
SALIX BARCLAYI	6
CAREX AQUATILIS	4
KOBRESIA MYOSUROIDES	4
BETULA PUMILA	4
DESCHAMPSIA CESPITOSA	4
TOMENTHYPNUM NITENS	3
FRAGARIA VIRGINIANA	2
SALIX BARRATTIANA	2
CAREX ATROSQUAMA	2
SALIX MYRTILLIFOLIA	2
SCIRPUS CESPITOSUS	2

Variable	Mean	Min	Max
NatSubR	7.9	7.0	8.0
Drainage	6.0	5.0	7.0
Moisture	7.3	5.0	9.0
Elevation	1677.0	1370.0	1900.0
Aspect	202.5	90.0	315.0
Slope	1.3	0.0	3.0

ESIS Plot #	Location (lat/long)					
94AW5021	51°	27'	30" N	116°	13'	8" W
94AW6073	50°	54'	4" N	115°	31'	40" W
94AW7008	51°	33'	46" N	116°	8'	35" W
94JD7089	51°	49'	50" N	116°	24'	30" W
94JE9122	53°	7'	25" N	118°	33'	16" W

94LC9177	52°	45'	38" N	117°	26'	58" W
94PA7030	51°	34'	53" N	116°	11'	27" W
94PA8032	51°	47'	27" N	116°	9'	28" W
94PA9011	53°	21'	10" N	118°	20'	33" W
94PA9046	53°	4'	54" N	118°	18'	34" W

Notes

Vaccinium scoparium – Salix spp. / Dicranum scoparium – Barbilophozia lycopodioides

Group as80
N = 11

Species	Cover
DICRANUM SCOPARIUM	32
VACCINIUM SCOPARIUM	9
BARBILOPHOZIA LYCOPODIOIDES	7
PICEA ENGELMANNII	7
SALIX VESTITA	6
ANTENNARIA LANATA	5
ABIES LASIOCARPA	5
CASSIOPE MERTENSIANA	3
PLEUROZIUM SCHREBERI	3
TROLLIUS ALBIFLORUS	3
DRYAS OCTOPETALA	3
SALIX ARCTICA	3
DREPANOCLADUS UNCINATUS	3
CASSIOPE TETRAGONA	2
CLADONIA SPP.	2
ARTEMISIA NORVEGICA	2
LUETKEA PECTINATA	2
AULACOMNIUM PALUSTRE	2

Variable	Mean	Min	Max
NatSubR	7.6	7.0	8.0
Drainage	4.4	3.0	6.0
Moisture	5.4	5.0	7.0
Elevation	2070.9	1920.0	2360.0
Aspect	135.0	0.0	315.0
Slope	21.8	5.0	67.0

ESIS Plot #	Location (lat/long)	
94AW5036	51° 17' 47" N	115° 54' 46" W
94JC8030	51° 49' 24" N	116° 1' 3" W
94JE9034	53° 25' 6" N	118° 45' 21" W
94JE9070	53° 0' 28" N	118° 23' 29" W

94JM7073	52°	41'	54" N	118°	15'	11" W
94JM7078	52°	40'	34" N	118°	10'	23" W
94LC9134	53°	10'	57" N	118°	46'	14" W
94LC9185	52°	33'	9" N	117°	22'	55" W
94PA7034	51°	31'	55" N	116°	10'	40" W
94SJ9059	53°	21'	0" N	118°	47'	58" W
94SJ9110	53°	14'	4" N	119°	6'	18" W

Notes

Betula glandulosa – Salix spp. – Potentilla fruticosa / Carex scirpoidea
Group as84
N = 14

Species	Cover
CAREX SCIRPOIDEA	23
BETULA GLANDULOSA	9
SALIX BARRATTIANA	7
POTENTILLA FRUTICOSA	6
PICEA GLAUCA	5
DREPANOCLADUS REVOLVENS	4
BRYUM PSEUDOTRIQUETRUM	4
ARCTOSTAPHYLOS RUBRA	3
TOMENTHYPNUM NITENS	3
CAREX CAPILLARIS	3
DICRANUM SCOPARIUM	3
SALIX GLAUCA	3
AULACOMNIUM PALUSTRE	2
ANTENNARIA LANATA	2
PINUS CONTORTA	2
SPHAGNUM WARNSTORFII	2

Variable	Mean	Min	Max
NatSubR	7.8	7.0	8.0
Drainage	5.4	4.0	6.0
Moisture	6.2	5.0	7.0
Elevation	1809.3	1420.0	2190.0
Aspect	199.3	45.0	315.0
Slope	6.1	0.0	17.0

ESIS Plot #	Location (lat/long)					
94AW5058	51°	23'	0" N	116°	3'	18" W
94AW5061	51°	20'	6" N	115°	54'	15" W
94AW7053	51°	49'	14" N	116°	46'	40" W
94AW7080	51°	54'	15" N	116°	53'	14" W
94JD7079	51°	54'	25" N	116°	49'	24" W
94JD7112	51°	49'	28" N	116°	37'	25" W
94JE8042	51°	49'	49" N	116°	0'	0" W

94JE8065	51°	36'	27" N	115°	54'	15" W
94JE9156	52°	27'	42" N	117°	18'	19" W
94JE9179	52°	13'	10" N	117°	5'	39" W
94PA7129	51°	43'	21" N	116°	18'	55" W
94PA7132	51°	44'	31" N	116°	19'	22" W
94PA7147	51°	39'	58" N	116°	11'	10" W
94SJ9076	53°	24'	8" N	119°	7'	46" W

Notes

Picea engelmannii / Salix vestita – Potentilla fruticosa / Valeriana sitchensis / Carex spp. / Dicranum scoparium

Group as87

N = 3

Species	Cover
SALIX VESTITA	36
DREPANOCLADUS UNCINATUS	32
VALERIANA SITCHENSIS	13
PICEA ENGELMANNII	13
POTENTILLA FRUTICOSA	13
CAREX CAPILLARIS	12
DICRANUM SCOPARIUM	11
CAREX SPP.	8
EMPETRUM NIGRUM	7
ARCTOSTAPHYLOS RUBRA	5
ARNICA CORDIFOLIA	5
PARNASSIA FIMBRIATA	4
PHYLLODOCE EMPETRIFORMIS	4
BRYUM SPP.	3
ELYMUS INNOVATUS	3
EQUISETUM SCIRPOIDES	3
POHLIA NUTANS	3
SALIX SPP.	3
SCAPANIA SPP.	3
TORTULA RURALIS	3
PLEUROZIUM SCHREBERI	3
PINUS CONTORTA	2
POLYTRICHUM JUNIPERINUM	2
SENECIO INDECORUS	2
ZIGADENUS ELEGANS	2

Variable	Mean	Min	Max
NatSubR	7.7	7.0	8.0
Drainage	5.0	5.0	5.0
Moisture			
Elevation	1880.0	1510.0	2090.0
Aspect	120.0	0.0	315.0
Slope	28.0	7.0	60.0

ESIS Plot #	Location (lat/long)					
94AW5064	51°	20'	55" N	115°	54'	13" W
94JD7047	52°	3'	0" N	116°	55'	7" W
D4JD8119	51°	22'	51" N	115°	41'	40" W

Notes

Pinus contorta – Picea engelmannii / Shepherdia canadensis – Arctostaphylos uva-ursi – Juniperus communis / Elymus innovatus

Group as88
N = 15

Species	Cover
SHEPHERDIA CANADENSIS	24
ELYMUS INNOVATUS	12
PINUS CONTORTA	11
ARCTOSTAPHYLOS UVA-URSI	6
JUNIPERUS COMMUNIS	6
PICEA ENGELMANNII	5
VACCINIUM SCOPARIUM	4
LINNAEA BOREALIS	3
FRAGARIA VIRGINIANA	3
SALIX GLAUCA	2

Variable	Mean	Min	Max
NatSubR	7.9	7.0	8.0
Drainage	2.6	2.0	4.0
Moisture	4.3	2.0	6.0
Elevation	1844.7	1580.0	2000.0
Aspect	204.0	45.0	270.0
Slope	38.3	13.0	61.0

ESIS Plot #	Location (lat/long)					
94AW5068	51°	18'	27" N	115°	48'	9" W
94AW6029	51°	5'	55" N	115°	39'	54" W
94AW6063	51°	4'	6" N	115°	38'	22" W
94AW6108	50°	54'	53" N	115°	31'	13" W
94AW6127	50°	58'	51" N	115°	25'	10" W
94AW6128	50°	58'	2" N	115°	25'	1" W
94AW6132	50°	54'	46" N	115°	22'	6" W
94AW6134	50°	54'	46" N	115°	22'	0" W
94JE8130	51°	22'	4" N	115°	34'	45" W
94JE9013	53°	7'	25" N	117°	45'	4" W
94JI8015	52°	28'	31" N	116°	54'	9" W
94JI8034	52°	38'	24" N	117°	1'	43" W

94PA7028	51°	35'	31" N	116°	12'	1" W
94SJ9056	53°	22'	59" N	118°	46'	52" W
D4JD7154	51°	24'	25" N	115°	46'	3" W

Notes

Salix arctica / Antennaria lanata – Artemisia norvegica

Group as89

N = 23

Species	Cover
ANTENNARIA LANATA	25
SALIX ARCTICA	10
ARTEMISIA NORVEGICA	6
PHYLLODOCE GLANDULIFLORA	4
VACCINIUM SCOPARIUM	3
POLYTRICHUM JUNIPERINUM	2
ANEMONE OCCIDENTALIS	2

Variable	Mean	Min	Max
NatSubR	7.3	7.0	8.0
Drainage	3.4	3.0	5.0
Moisture	5.2	5.0	6.0
Elevation	2244.3	2050.0	2470.0
Aspect	173.6	0.0	315.0
Slope	20.5	0.0	48.0

ESIS Plot #	Location (lat/long)					
94AW5070	51°	28'	14" N	116°	3'	55" W
94AW5071	51°	28'	0" N	116°	3'	42" W
94AW5072	51°	27'	28" N	116°	3'	39" W
94AW5073	51°	27'	25" N	116°	3'	51" W
94AW5086	51°	28'	8" N	116°	3'	58" W
94JC6019	52°	6'	19" N	116°	52'	1" W
94JC7068	52°	26'	30" N	118°	13'	39" W
94JD5063	51°	4'	54" N	115°	46'	27" W
94JD5064	51°	4'	49" N	115°	47'	5" W
94JD6035	50°	50'	50" N	115°	34'	22" W
94JD9060	53°	17'	5" N	118°	41'	22" W
94JE9060	53°	0'	39" N	118°	23'	18" W
94JE9095	53°	16'	22" N	118°	53'	44" W
94JI5029	52°	45'	28" N	118°	6'	58" W
94JM7074	52°	42'	8" N	118°	13'	25" W
94LC9102	53°	15'	42" N	119°	6'	11" W

94LC9125	53°	12'	37" N	118°	30'	1"	W
94PA8136	51°	27'	54" N	115°	45'	21"	W
94SJ8068	52°	46'	30" N	117°	27'	55"	W
94SJ9080	53°	19'	47" N	118°	56'	49"	W
94SJ9081	53°	19'	20" N	118°	56'	48"	W
94SJ9082	53°	19'	15" N	118°	57'	54"	W
D4JD8060	51°	45'	57" N	115°	50'	22"	W

Notes

Herb cover exceeds shrub, may be better classified as a herbland.

Salix barrattiana* (- *Salix spp.*) / Herb / *Aulacomnium palustre

Group as93
N = 15

Species	Cover
AULACOMNIUM PALUSTRE	56
SALIX BARRATTIANA	13
TROLLIUS ALBIFLORUS	6
SALIX GLAUCA	5
SCIRPUS CESPITOSUS	4
ERIGERON PEREGRINUS	4
SENECIO TRIANGULARIS	4
SALIX FARRIAE	4
VALERIANA SITCHENSIS	3
SALIX ARCTICA	3
CAMPYLIUM STELLATUM	3
ARTEMISIA NORVEGICA	3
JUNCUS SPP.	2
CALTHA LEPTOSEPALA	2

Variable	Mean	Min	Max
NatSubR	7.5	7.0	8.0
Drainage	5.7	4.0	7.0
Moisture	7.3	5.0	9.0
Elevation	2034.0	1750.0	2290.0
Aspect	156.0	0.0	315.0
Slope	7.5	0.0	18.0

ESIS Plot #	Location (lat/long)	
94AW5074	51° 27' 20" N	116° 3' 30" W
94AW5082	51° 27' 36" N	116° 2' 52" W
94BK6106	51° 7' 16" N	115° 50' 33" W
94BK6110	51° 7' 0" N	115° 50' 48" W
94JC7053	52° 46' 6" N	117° 47' 41" W
94JC7057	52° 44' 48" N	117° 46' 19" W
94JD5075	51° 33' 9" N	116° 19' 39" W
94JD6053	51° 6' 53" N	115° 48' 24" W

94JE9088	53°	17'	45" N	118°	55'	33" W
94JM7092	52°	55'	59" N	118°	22'	43" W
94LC9114	53°	13'	24" N	118°	26'	37" W
94LC9166	53°	0'	22" N	118°	38'	33" W
94PA7029	51°	35'	20" N	116°	12'	18" W
94PA9114	52°	42'	43" N	117°	7'	54" W
D4JD8083	51°	39'	10" N	115°	52'	22" W

Notes

Pinus contorta / Juniperus communis – Arctostaphylos uva-ursi – Shepherdia canadensis

Group as107

N = 12

Species	Cover
PINUS CONTORTA	12
JUNIPERUS COMMUNIS	9
ARCTOSTAPHYLOS UVA-URSI	7
SHEPHERDIA CANADENSIS	6
ELYMUS INNOVATUS	4
POPULUS TREMULOIDES	3

Variable	Mean	Min	Max
NatSubR	7.9	7.0	8.0
Drainage	2.8	2.0	3.0
Moisture	3.7	2.0	5.0
Elevation	1837.5	1460.0	2160.0
Aspect	212.7	90.0	270.0
Slope	59.5	40.0	80.0

ESIS Plot #	Location (lat/long)					
94AW5101	51°	18'	52" N	115°	58'	11" W
94AW6030	51°	6'	6" N	115°	39'	19" W
94AW6120	50°	52'	6" N	115°	27'	31" W
94JC8004	51°	4'	55" N	115°	38'	21" W
94JC8089	51°	46'	30" N	116°	31'	37" W
94JE8113	51°	36'	57" N	115°	36'	22" W
94JE8129	51°	22'	58" N	115°	34'	53" W
94JE8135	51°	33'	30" N	115°	34'	21" W
94JE9126	53°	7'	40" N	118°	29'	35" W
94JI9006	53°	23'	45" N	118°	19'	34" W
94JI9008	53°	23'	46" N	118°	18'	31" W
94JM7021	52°	51'	24" N	117°	45'	21" W

Notes

Includes some low-elevation plots which may be better classified as montane.

Salix arctica / Erigeron peregrinus
Group as115
N = 5

Species	Cover
SALIX ARCTICA	13
ERIGERON PEREGRINUS	6
ANTENNARIA LANATA	4
SALIX RETICULATA	3
TROLLIUS ALBIFLORUS	3
PHYLLODOCE GLANDULIFLORA	2

Variable	Mean	Min	Max
NatSubR	7.4	7.0	8.0
Drainage	5.0	5.0	5.0
Moisture	5.5	5.0	7.0
Elevation	2196.0	2070.0	2400.0
Aspect	171.0	90.0	270.0
Slope	14.0	2.0	24.0

ESIS Plot #	Location (lat/long)
94AW5133	51° 24' 52" N 115° 56' 24" W
94AW7032	51° 51' 3" N 116° 52' 48" W
94IC6106	52° 4' 3" N 117° 11' 50" W
94PA7117	51° 56' 56" N 116° 52' 30" W
94SJ7069	52° 36' 2" N 118° 15' 13" W

Notes

Vaccinium scoparium – Vaccinium myrtillus
Group as116
N = 25

Species	Cover
VACCINIUM SCOPARIUM	37
PICEA ENGELMANNII	6
VACCINIUM MYRTILLUS	6
PLEUROZIUM SCHREBERI	3
LARIX LYALLI	3
PHYLLODOCE GLANDULIFLORA	3
PINUS CONTORTA	2
ABIES LASIOCARPA	2
ERIGERON PEREGRINUS	2

Variable	Mean	Min	Max
NatSubR	7.8	7.0	8.0
Drainage	2.9	2.0	3.0
Moisture	4.9	3.0	6.0
Elevation	2096.0	1550.0	2400.0
Aspect	170.6	45.0	315.0
Slope	29.9	5.0	60.0

ESIS Plot #	Location (lat/long)					
94AW5134	51°	24'	28" N	115°	56'	54" W
94AW6070	50°	50'	16" N	115°	33'	50" W
94AW6081	51°	6'	13" N	115°	51'	10" W
94AW6102	50°	55'	30" N	115°	36'	16" W
94AW6104	50°	55'	34" N	115°	35'	0" W
94AW6115	50°	44'	35" N	115°	22'	42" W
94JC8005	51°	14'	49" N	115°	37'	44" W
94JC8008	51°	16'	14" N	115°	37'	55" W
94JD6041	50°	52'	37" N	115°	35'	9" W
94JD6083	51°	1'	39" N	115°	34'	58" W
94JD6087	51°	10'	13" N	115°	56'	59" W
94JD7096	51°	47'	46" N	116°	23'	6" W
94JD7107	51°	46'	4" N	116°	22'	23" W
94JD9026	52°	42'	25" N	117°	41'	48" W

94JE8081	51°	33'	46" N	115°	55'	30" W
94JE8126	51°	25'	53" N	115°	37'	12" W
94JI7068	52°	43'	10" N	118°	15'	30" W
94JI8067	52°	50'	0" N	117°	25'	39" W
94JM7023	52°	54'	28" N	118°	28'	36" W
94JM7026	52°	55'	2" N	118°	29'	12" W
94JM7034	52°	43'	33" N	117°	40'	19" W
94JM7036	52°	43'	27" N	117°	42'	51" W
94JM7054	52°	42'	12" N	117°	33'	58" W
94PA7026	51°	36'	30" N	116°	13'	35" W
D4JD8120	51°	22'	55" N	115°	41'	21" W

Notes

Betula glandulosa – Ledum groenlandicum – Salix glauca / Carex aquatilis – Scirpus cespitosus / Tomenthypnum nitens – Aulacomnium palustre

Group as122
N = 22

Species	Cover
TOMENTHYPNUM NITENS	46
CAREX AQUATILIS	10
BETULA GLANDULOSA	9
AULACOMNIUM PALUSTRE	7
LEDUM GROENLANDICUM	7
SALIX GLAUCA	6
SCIRPUS CESPITOSUS	6
CAREX VAGINATA	6
PICEA MARIANA	5
HYLOCOMIUM SPLENDENS	5
SPHAGNUM WARNSTORFII	5
POTENTILLA FRUTICOSA	4
SALIX MYRTILLIFOLIA	4
MENZIESIA FERRUGINEA	3
SPHAGNUM FUSCUM	3
ARCTOSTAPHYLOS RUBRA	3

Variable	Mean	Min	Max
NatSubR	7.9	7.0	8.0
Drainage	6.5	6.0	7.0
Moisture	7.8	6.0	9.0
Elevation	1634.1	1270.0	2260.0
Aspect	150.8	0.0	315.0
Slope	6.5	0.0	20.0

ESIS Plot #	Location (lat/long)	
94AW6050	51° 8' 21" N	115° 36' 28" W
94AW7010	51° 31' 12" N	116° 9' 57" W
94BK5018	51° 16' 16" N	116° 0' 30" W
94JC8026	51° 48' 16" N	116° 3' 52" W
94JD5017	51° 16' 21" N	115° 48' 48" W
94JD9021	53° 3' 58" N	117° 52' 26" W

94JE9011	53°	16'	43" N	118°	1'	49" W
94JE9030	53°	25'	43" N	118°	40'	55" W
94JE9055	53°	16'	2" N	118°	18'	51" W
94JE9075	52°	58'	30" N	118°	14'	30" W
94JI5078	52°	34'	9" N	117°	49'	6" W
94JI5109	52°	33'	50" N	117°	49'	45" W
94JI8095	52°	25'	4" N	117°	24'	8" W
94JI9014	53°	20'	18" N	118°	18'	18" W
94LC9162	52°	27'	27" N	117°	28'	50" W
94PA7017	51°	16'	2" N	115°	31'	4" W
94PA7107	51°	53'	36" N	116°	41'	11" W
94PA7108	51°	47'	51" N	116°	34'	14" W
94PA7141	51°	42'	49" N	116°	18'	14" W
94PA7161	51°	35'	34" N	116°	8'	6" W
94PA9006	53°	20'	16" N	118°	21'	42" W
94SJ9037	53°	21'	27" N	118°	22'	19" W

Notes

***Salix farriae – Salix barclayi* (- *Salix spp.*) / Herb**

Group as131

N = 6

Species	Cover
SALIX FARRIAE	18
SALIX BARCLAYI	14
FRAGARIA VIRGINIANA	9
SALIX BARRATTIANA	8
EPILOBIUM ANGUSTIFOLIUM	7
THALICTRUM OCCIDENTALE	7
ELYMUS INNOVATUS	6
TROLLIUS ALBIFLORUS	6
SALIX GLAUCA	5
AULACOMNIUM PALUSTRE	4
ERIGERON PEREGRINUS	4
VALERIANA SITCHENSIS	4
PEDICULARIS BRACTEOSA	3
TOMENTHYPNUM NITENS	3
VIOLA CANADENSIS	3
DELPHINIUM GLAUCUM	2
LONICERA INVOLUCRATA	2
ABIES LASIOCARPA	2
AQUILEGIA FORMOSA	2

Variable	Mean	Min	Max
NatSubR	7.5	7.0	8.0
Drainage	4.6	3.0	6.0
Moisture	6.3	5.0	7.0
Elevation	1860.0	1720.0	1960.0
Aspect	202.5	135.0	270.0
Slope	19.4	0.0	42.0

ESIS Plot #	Location (lat/long)	
94AW6100	50° 46' 3" N	115° 24' 27" W
94JD5044	51° 28' 14" N	116° 0' 22" W
94JI9121	53° 4' 13" N	118° 43' 15" W
94PA9025	53° 24' 6" N	118° 48' 50" W

94PA9050	53°	9'	7" N	118°	17'	2" W
94SJ9087	53°	22'	42" N	119°	1'	11" W

Notes

Vaccinium scoparium – Juniperus communis / Epilobium angustifolium / Polytrichum juniperinum

Group as135

N = 8

Species	Cover
EPILOBIUM ANGUSTIFOLIUM	18
VACCINIUM SCOPARIUM	14
JUNIPERUS COMMUNIS	8
POLYTRICHUM JUNIPERINUM	6
PICEA ENGELMANNII	3
SHEPHERDIA CANADENSIS	3
DANTHONIA CALIFORNICA	3
CERATODON PURPUREUS	3
TRISETUM SPICATUM	3
SALIX GLAUCA	3
LINNAEA BOREALIS	2
PINUS CONTORTA	2
FRAGARIA VIRGINIANA	2

Variable	Mean	Min	Max
NatSubR	7.8	7.0	8.0
Drainage	3.0	3.0	3.0
Moisture	3.0	3.0	3.0
Elevation	1981.3	1710.0	2260.0
Aspect	236.3	135.0	315.0
Slope	34.6	18.0	55.0

ESIS Plot #	Location (lat/long)					
94AW6105	50°	55'	37" N	115°	33'	9" W
94BK6098	50°	51'	55" N	115°	31'	22" W
94BK6099	50°	52'	6" N	115°	31'	11" W
94JD5031	51°	13'	43" N	116°	2'	37" W
94JD5032	51°	13'	31" N	116°	1'	58" W
94JD5034	51°	13'	48" N	116°	1'	37" W
94JD7082	51°	49'	3" N	116°	26'	0" W
D4JD7141	51°	27'	36" N	115°	48'	5" W

Salix arctica – Salix reticulata / Sibbaldia procumbens / Carex spp. / Polytrichum spp.
Group as144
N = 3

Species	Cover
POLYTRICHUM SPP.	14
SALIX ARCTICA	10
SALIX RETICULATA	6
CAREX SPP.	6
SIBBALDIA PROCUMBENS	6
SELAGINELLA DENSA	4
CETRARIA SPP.	3
ANTENNARIA LANATA	2
CAREX NIGRICANS	2
CASTELLEJA OCCIDENTALIS	2
POA SPP.	2
ARTEMISIA NORVEGICA	2
DICRANUM SPP.	2
POTENTILLA DIVERSIFOLIA	2

Variable	Mean	Min	Max
NatSubR	7.0	7.0	7.0
Drainage			
Moisture	5.0	5.0	5.0
Elevation	2373.3	2260.0	2470.0
Aspect	180.0	135.0	225.0
Slope	2.0	0.0	4.0

ESIS Plot #	Location (lat/long)					
94AW7001	51°	33'	45" N	116°	12'	6" W
94JC6055	52°	22'	19" N	117°	9'	21" W
94JC6056	52°	23'	15" N	117°	9'	14" W

Notes

Dryas drummondii

Group as154
N = 4

Species	Cover
DRYAS DRUMMONDII	50
SALIX BRACHYCARPA	5
PICEA ENGELMANNII	2

Variable	Mean	Min	Max
NatSubR	8.0	8.0	8.0
Drainage	2.5	2.0	3.0
Moisture	4.3	2.0	9.0
Elevation	1542.5	1450.0	1670.0
Aspect	90	45.0	135.0
Slope	7.5	0.0	27.0

ESIS Plot #	Location (lat/long)					
94AW7041	51°	48'	43" N	116°	48'	17" W
94JC6040	52°	2'	18" N	117°	4'	8" W
94JI8093	52°	16'	21" N	117°	18'	30" W
94PA7092	51°	54'	32" N	116°	57'	39" W

Notes

Salix glauca – Arctostaphylos uva-ursi / Elymus innovatus
Group as192
N = 55

Species	Cover
SALIX GLAUCA	26
ELYMUS INNOVATUS	24
ARCTOSTAPHYLOS UVA-URSI	7
FRAGARIA VIRGINIANA	4
HEDYSARUM SULPHURESCENS	4
PICEA ENGELMANNII	3
JUNIPERUS COMMUNIS	2

Variable	Mean	Min	Max
NatSubR	7.5	7.0	8.0
Drainage	3.0	1.0	5.0
Moisture	4.6	2.0	6.0
Elevation	2063.8	1400.0	2330.0
Aspect	195.3	45.0	315.0
Slope	36.3	0.0	81.0

ESIS Plot #	Location (lat/long)					
94BK6091	50°	53'	35" N	115°	30'	24" W
94IC8077	51°	19'	55" N	115°	37'	55" W
94IC8079	51°	25'	16" N	115°	43'	17" W
94IC8087	51°	29'	7" N	115°	43'	40" W
94JC6033	52°	12'	14" N	117°	6'	32" W
94JC6078	52°	13'	13" N	117°	12'	22" W
94JC7045	52°	37'	48" N	117°	27'	37" W
94JC8019	51°	50'	57" N	116°	4'	40" W
94JC8060	51°	37'	40" N	115°	42'	6" W
94JC8069	51°	35'	16" N	115°	48'	45" W
94JC8076	51°	30'	49" N	115°	48'	42" W
94JD5084	51°	38'	5" N	116°	19'	22" W
94JD7104	51°	45'	57" N	116°	20'	38" W
94JD9050	53°	6'	36" N	118°	19'	56" W
94JD9064	53°	19'	9" N	118°	43'	12" W
94JE8026	51°	51'	23" N	116°	3'	36" W

94JE8031	51°	54'	11" N	116°	4'	34" W
94JE8048	51°	45'	42" N	115°	57'	16" W
94JE8082	51°	33'	46" N	115°	54'	56" W
94JE8088	51°	32'	19" N	115°	53'	41" W
94JE8093	51°	31'	12" N	115°	50'	24" W
94JE8103	51°	36'	12" N	115°	40'	51" W
94JE8104	51°	36'	5" N	115°	38'	34" W
94JE8112	51°	36'	45" N	115°	36'	21" W
94JE8131	51°	22'	10" N	115°	34'	27" W
94JE8132	51°	23'	4" N	115°	34'	43" W
94JE8147	51°	37'	21" N	115°	49'	15" W
94JE8149	51°	36'	4" N	115°	47'	26" W
94JE9022	53°	22'	54" N	118°	40'	26" W
94JE9026	53°	25'	49" N	118°	42'	15" W
94JE9051	53°	25'	59" N	118°	51'	33" W
94JI6057	52°	24'	21" N	117°	0'	9" W
94JI9056	53°	23'	37" N	118°	38'	22" W
94PA7037	51°	11'	5" N	115°	18'	42" W
94PA7038	51°	11'	33" N	115°	18'	7" W
94PA7040	51°	12'	12" N	115°	20'	21" W
94PA7179	51°	24'	14" N	115°	49'	24" W
94PA8074	51°	43'	46" N	115°	54'	32" W
94PA8108	51°	35'	41" N	115°	36'	15" W
94PA8114	51°	33'	56" N	115°	47'	41" W
94PA8118	51°	25'	7" N	115°	30'	52" W
94PA9004	53°	18'	57" N	118°	22'	55" W
94PA9095	53°	24'	43" N	119°	5'	42" W
94PA9115	52°	42'	10" N	117°	7'	34" W
94PA9116	52°	42'	57" N	117°	7'	8" W
94PA9118	52°	38'	12" N	117°	9'	51" W
94SJ8035	52°	30'	57" N	117°	3'	28" W
94SJ8075	52°	37'	43" N	117°	0'	48" W
D4JD8019	51°	29'	55" N	115°	34'	5" W
D4JD8063	51°	45'	24" N	115°	49'	48" W
D4JD8066	51°	43'	57" N	115°	48'	51" W
D4JD8068	51°	43'	36" N	115°	49'	9" W
D4JD8084	51°	39'	46" N	115°	50'	54" W
D4JD8114	51°	30'	19" N	115°	45'	57" W
D4JD9080	51°	35'	0" N	115°	48'	58" W

Notes

***Salix reticulata – Dryas octopetala – Cassiope tetragona* / Lichen Group as266**
N = 5

Species	Cover
SALIX RETICULATA	7
DRYAS OCTOPETALA	6
CASSIOPE TETRAGONA	4
CLADONIA PYXIDATA	3
LEPRARIA NEGLECTA	3
CETRARIA NIVALIS	2
CETRARIA COMMIXTA	2
SELAGINELLA DENSA	2
FESTUCA SAXIMONTANA	2
KOBRESIA MYOSUROIDES	2

Variable	Mean	Min	Max
NatSubR	7.2	7.0	8.0
Drainage	2.8	2.0	4.0
Moisture	4.6	3.0	5.0
Elevation	2214.0	2150.0	2300.0
Aspect	123.8	45.0	180.0
Slope	13.6	5.0	25.0

ESIS Plot #	Location (lat/long)					
94JC7020	52°	51'	13" N	118°	22'	8" W
94JE9077	52°	56'	21" N	118°	13'	48" W
94JE9172	53°	4'	39" N	118°	12'	33" W
94LC9158	53°	16'	9" N	118°	41'	49" W
94SJ9040	53°	20'	19" N	118°	51'	21" W

Notes

Betula pumila – Vaccinium caespitosum / Fragaria virginiana / Poa alpina
Group as275
N = 2

Species	Cover
POA ALPINA	23
BETULA PUMILA	13
FRAGARIA VIRGINIANA	10
VACCINIUM CAESPITOSUM	6
DANTHONIA CALIFORNICA	5
CAREX SPP.	4
SALIX GLAUCA	4
EPILOBIUM ANGUSTIFOLIUM	3
SIBBALDIA PROCUMBENS	3
AULACOMNIUM PALUSTRE	3
PHLEUM COMMUTATUM	3
POLYTRICHUM JUNIPERINUM	3
POLYTRICHUM PILIFERUM	3
CLADINA MITIS	2
POTENTILLA FRUTICOSA	2

Variable	Mean	Min	Max
NatSubR	8.0	8.0	8.0
Drainage			
Moisture	5.5	5.0	6.0
Elevation	1730.0	1660.0	1800.0
Aspect	45.0	45.0	45.0
Slope	2.5	0.0	5.0

ESIS Plot #	Location (lat/long)
94JC7061	52° 30' 24" N 118° 10' 0" W
94SJ7041	52° 43' 13" N 117° 37' 13" W

Notes

A borderline grassland group.

Salix glauca – Betula glandulosa – Potentilla fruticosa / Danthonia californica
Group as318
N = 11

Species	Cover
DANTHONIA CALIFORNICA	44
SALIX GLAUCA	14
BETULA GLANDULOSA	11
POTENTILLA FRUTICOSA	9
SALIX BARRATTIANA	5
AGROPYRON DASYSTACHYUM	4
FRAGARIA VIRGINIANA	4
CLADINA MITIS	4
AULACOMNIUM PALUSTRE	3
ERIGERON PEREGRINUS	3
TOMENTHYPNUM NITENS	3
TORTULA NORVEGICA	3
KOBRESIA MYOSUROIDES	2
POTENTILLA DIVERSIFOLIA	2
TRISETUM SPICATUM	2
PHLEUM COMMUTATUM	2

Variable	Mean	Min	Max
NatSubR	7.6	7.0	8.0
Drainage	4.7	3.0	6.0
Moisture	5.9	5.0	7.0
Elevation	2001.8	1720.0	2250.0
Aspect	114.5	0.0	180.0
Slope	3.7	2.0	10.0

ESIS Plot #	Location (lat/long)					
94JC8080	51°	28'	45" N	115°	42'	33" W
94JD6078	50°	58'	41" N	115°	34'	31" W
94PA7152	51°	39'	52" N	116°	10'	1" W
94PA7162	51°	34'	45" N	116°	7'	24" W
94PA7171	51°	31'	36" N	116°	4'	54" W
94PA7172	51°	31'	55" N	116°	2'	15" W
94PA8086	51°	28'	10" N	115°	51'	39" W

94PA9019	53°	22'	55" N	118°	47'	41" W
D4JD7157	51°	36'	43" N	116°	7'	45" W
D4JD9089	51°	21'	7" N	116°	14'	19" W
D4PA8170	51°	43'	5" N	116°	29'	37" W

Notes

Probably better classified as a grassland.

Ledum groenlandicum – Salix glauca / Equisetum arvense / Sphagnum fuscum – Drepanocladus revolvens

Group as349
N = 5

Species	Cover
EQUISETUM ARVENSE	37
SPHAGNUM FUSCUM	20
LEDUM GROENLANDICUM	15
SALIX GLAUCA	13
DREPANOCLADUS REVOLVENS	12
TOMENTHYPNUM NITENS	9
CAREX AQUATILIS	5
CORNUS CANADENSIS	4
EMPETRUM NIGRUM	4
PICEA ENGELMANNII X GLAUCA	4
CAREX MICROGLOCHIN	4
SALIX FARRIAE	4
CAMPYLIUM STELLATUM	3
DREPANOCLADUS SPP.	3
BETULA GLANDULOSA	3
BRYUM PSEUDOTRIQUETRUM	2
CASTELLEJA OCCIDENTALIS	2
SALIX BARRATTIANA	2

Variable	Mean	Min	Max
NatSubR	7.8	7.0	8.0
Drainage	6.0	5.0	7.0
Moisture	6.5	5.0	9.0
Elevation	1646.0	1480.0	1880.0
Aspect	180.0	45.0	225.0
Slope	4.6	2.0	7.0

ESIS Plot #	Location (lat/long)	
94JD6026	51° 9' 2" N	115° 39' 10" W
94JM8102	52° 55' 22" N	117° 46' 4" W
94SJ9097	53° 11' 49" N	119° 3' 43" W
94SJ9113	53° 13' 19" N	119° 9' 8" W

94SJ9122 53° 13' 24" N 119° 4' 40" W

Notes

Vaccinium membranaceum / Epilobium angustifolium
Group as365
N = 3

Species	Cover
VACCINIUM MEMBRANACEUM	43
EPILOBIUM ANGUSTIFOLIUM	7
ABIES LASIOCARPA	5
ARNICA CORDIFOLIA	3
JUNIPERUS COMMUNIS	3
PINUS ALBICAULIS	3
PHYLLODOCE EMPETRIFORMIS	3
PICEA ENGELMANNII	2

Variable	Mean	Min	Max
NatSubR	7.7	7.0	8.0
Drainage	2.5	2.0	3.0
Moisture	4.0	3.0	5.0
Elevation	1996.7	1890.0	2060.0
Aspect	180.0	0.0	315.0
Slope	47.3	27.0	75.0

ESIS Plot #	Location (lat/long)
94JD6093	51° 13' 40" N 116° 0' 52" W
94JE8007	51° 21' 33" N 115° 39' 52" W
94JE9131	53° 3' 46" N 118° 32' 1" W

Notes

Potentilla fruticosa – Arctostaphylos uva-ursi / Elymus innovatus – Koeleria macrantha

Group as422
N = 6

Species	Cover
POTENTILLA FRUTICOSA	15
ARCTOSTAPHYLOS UVA-URSI	9
ELYMUS INNOVATUS	8
KOELERIA MACRANTHA	7
FRAGARIA VIRGINIANA	4
MYOSOTIS ALPESTRIS	3
ANDROSACE CHAMAEJASME	3
OXYTROPIS SPP.	3
HEDYSARUM ALPINUM	2
OXYTROPIS SPLENDENS	2
POA SPP.	2
ROSA ACICULARIS	2

Variable	Mean	Min	Max
NatSubR	7.8	7.0	8.0
Drainage	2.7	2.0	3.0
Moisture	4.3	3.0	5.0
Elevation	1795.0	1240.0	2170.0
Aspect	187.5	135.0	225.0
Slope	62.2	45.0	75.0

ESIS Plot #	Location (lat/long)					
94JE8028	51°	51'	17" N	116°	3'	1" W
94JE8114	51°	35'	6" N	115°	38'	53" W
94JI9018	53°	15'	58" N	118°	28'	44" W
94SJ8005	53°	6'	26" N	117°	45'	27" W
94SJ8039	52°	32'	3" N	117°	0'	15" W
94SJ8062	52°	53'	28" N	117°	28'	40" W

Notes

Salix spp. / Fragaria virginiana – Penstemon procerus / Agropyron violaceum Group as479
N = 2

Species	Cover
AGROPYRON VIOLACEUM	23
SALIX BARRATTIANA	6
SALIX GLAUCA	6
FRAGARIA VIRGINIANA	6
PENSTEMON PROCERUS	6
SALIX SPP.	6
ANEMONE MULTIFIDA	5
TROLLIUS ALBIFLORUS	4
ACHILLEA MILLEFOLIUM	3
GENTIANELLA AMARELLA	3
POTENTILLA FRUTICOSA	3
POA PRATENSIS	3
VALERIANA SITCHENSIS	3
CAREX ATROSQUAMA	2
CAREX OBTUSATA	2

Variable	Mean	Min	Max
NatSubR	7.5	7.0	8.0
Drainage	3.0	3.0	3.0
Moisture	5.5	5.0	6.0
Elevation	1765.0	1390.0	2140.0
Aspect	225.0	135.0	315.0
Slope	3.5	3.0	4.0

ESIS Plot #	Location (lat/long)	
94JE8125	51° 25' 36" N	115° 37' 28" W
94SJ9032	53° 21' 13" N	118° 24' 51" W

Notes

Salix glauca – Salix barrattiana – Arctostaphylos uva-ursi / Koeleria macrantha / Tortula ruralis

Group as515
N = 4

Species	Cover
KOELERIA MACRANTHA	23
TORTULA RURALIS	14
SALIX GLAUCA	10
SALIX BARRATTIANA	8
OXYTROPIS CUSICKII	5
ARCTOSTAPHYLOS UVA-URSI	5
OXYTROPIS SPLENDENS	5
BROMUS SPP.	4
HEDYSARUM ALPINUM	4
PICEA ENGELMANNII	3
ANTENNARIA LANATA	3
JUNIPERUS HORIZONTALIS	3
ACHILLEA MILLEFOLIUM	3
CAREX SCIRPOIDEA	3
DRYAS OCTOPETALA	2
FRAGARIA VIRGINIANA	2
POTENTILLA DIVERSIFOLIA	2

Variable	Mean	Min	Max
NatSubR	7.5	7.0	8.0
Drainage	2.8	2.0	3.0
Moisture	5.0	5.0	5.0
Elevation	2005.0	1880.0	2070.0
Aspect	180.0	135.0	225.0
Slope	44.5	18.0	75.0

ESIS Plot #	Location (lat/long)					
94JE9032	53°	24'	52" N	118°	44'	28" W
94SJ9012	53°	22'	33" N	118°	13'	31" W
D4JD8098	51°	31'	41" N	115°	42'	6" W
D4JD8102	51°	32'	41" N	115°	42'	56" W

Abies lasiocarpa / Salix vestita – Salix glauca – Salix barrattiana / Artemisia norvegica
Group as535
N = 9

Species	Cover
SALIX VESTITA	20
ABIES LASIOCARPA	14
SALIX GLAUCA	7
ARTEMISIA NORVEGICA	6
DICRANUM BREVIFOLIUM	6
BETULA GLANDULOSA	5
ELYMUS INNOVATUS	4
SALIX BARRATTIANA	4
HYLOCOMIUM SPLENDENS	4
BRACYTHECIUM GROENLANDICUM	4
PICEA ENGELMANNII	3

Variable	Mean	Min	Max
NatSubR	7.6	7.0	8.0
Drainage	3.2	2.0	6.0
Moisture	5.1	5.0	6.0
Elevation	1910.0	1610.0	2180.0
Aspect	130.0	0.0	315.0
Slope	44.1	22.0	55.0

ESIS Plot #	Location (lat/long)					
94JE9074	52°	58'	23" N	118°	15'	21" W
94JE9141	53°	3'	22" N	118°	16'	45" W
94JE9143	53°	3'	10" N	118°	16'	19" W
94JE9176	53°	4'	3" N	118°	10'	33" W
94JI9024	53°	18'	24" N	118°	26'	17" W
94JI9088	53°	5'	32" N	118°	24'	25" W
94LC9058	53°	8'	47" N	118°	7'	17" W
94PA7118	52°	2'	39" N	116°	52'	45" W
94PA7138	51°	45'	10" N	116°	21'	33" W

Notes

Abies lasiocarpa / Rhododendron albiflorum – Phyllodoce empetriformis

Group as577

N = 5

Species	Cover
RHODODENDRON ALBIFLORUM	20
ABIES LASIOCARPA	10
PHYLLODOCE EMPETRIFORMIS	9
VACCINIUM MEMBRANACEUM	5
BARBILOPHOZIA LYCOPODIOIDES	4
CASSIOPE TETRAGONA	4
CLADINA MITIS	4
PINUS CONTORTA	3
PICEA ENGELMANNII	3
DICRANUM BREVIFOLIUM	3
SALIX GLAUCA	3
PELTIGERA APHTHOSA	3
DICRANUM SCOPARIUM	3
PICEA ENGELMANNII X GLAUCA	2
ARNICA CORDIFOLIA	2
BETULA GLANDULOSA	2
CASSIOPE MERTENSIANA	2

Variable	Mean	Min	Max
NatSubR	8.0	8.0	8.0
Drainage	3.3	3.0	4.0
Moisture	4.5	3.0	5.0
Elevation	1890.0	1830.0	1980.0
Aspect	135.0	45.0	270.0
Slope	51.0	15.0	70.0

ESIS Plot #	Location (lat/long)
94JE9166	53° 21' 18" N 118° 3' 0" W
94JI5020	52° 36' 40" N 117° 54' 51" W
94LC9067	53° 8' 57" N 118° 26' 4" W
94SJ9003	53° 23' 40" N 118° 16' 4" W
94SJ9121	53° 13' 37" N 119° 3' 36" W

***Salix arctica / Equisetum scirpoides / Tortula norvegica* – Pert dac**

Group as716

N = 3

Species	Cover
TORTULA NORVEGICA	27
PERT DAC	17
SALIX ARCTICA	12
EQUISETUM SCIRPOIDES	8
ERIGERON PEREGRINUS	5
BRYUM PSEUDOTRIQUETRUM	5
TROLLIUS ALBIFLORUS	5
PELTIGERA RUFESCENS	4
POTENTILLA DIVERSIFOLIA	4
SALIX GLAUCA	3
DRYAS OCTOPETALA	2

Variable	Mean	Min	Max
NatSubR	7.0	7.0	7.0
Drainage	4.5	4.0	5.0
Moisture	4.3	2.0	6.0
Elevation	2223.3	2080.0	2380.0
Aspect	150.0	135.0	180.0
Slope	4.3	2.0	8.0

ESIS Plot #	Location (lat/long)					
94JM7025	52°	56'	17" N	118°	29'	51" W
94PA7181	51°	21'	31" N	115°	47'	22" W
94PA8163	51°	40'	54" N	116°	23'	40" W

Notes

Probably better classified as a non-vascular dominated community.

Salix glauca / Valeriana sitchensis / Deschampsia cespitosa – Carex aquatilis / Aulacomnium palustre

Group as944
N = 6

Species	Cover
SALIX GLAUCA	36
DESCHAMPSIA CESPITOSA	30
CAREX AQUATILIS	12
ASTER CILIOLATUS	9
VALERIANA SITCHENSIS	7
AULACOMNIUM PALUSTRE	5
BRACYTHECIUM SPP.	5
BETULA PUMILA	3
CAREX CAPILLARIS	3
SALIX MYRTILLIFOLIA	3
ERIGERON PEREGRINUS	3
CAMPYLIUM STELLATUM	3
ROSA ACICULARIS	3
SALIX BOOTHII	3
BRACYTHECIUM GROENLANDICUM	2
JUNCUS DRUMMONDII	2
DELPHINIUM GLAUCUM	2
FRAGARIA VIRGINIANA	2

Variable	Mean	Min	Max
NatSubR	7.8	7.0	8.0
Drainage	5.4	4.0	6.0
Moisture	6.0	5.0	7.0
Elevation	1798.3	1640.0	1880.0
Aspect	72.0	0.0	135.0
Slope	7.0	0.0	15.0

ESIS Plot #	Location (lat/long)	
94PA8057	51° 34' 37" N	115° 57' 39" W
94PA8109	51° 34' 57" N	115° 36' 16" W
94PA8143	51° 22' 35" N	115° 37' 47" W
D4JD8056	51° 39' 24" N	115° 54' 51" W

D4JD8090	51°	39'	13" N	115°	49'	53" W
D4JD8106	51°	33'	48" N	115°	40'	42" W

Notes

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Appendices

Appendix 1. List of all Rocky Mountain shrubland plots sorted by group number.

A list of all plots included in the analysis and their group numbers is included in the file *Group_ID.xls.*

Appendix 2. Classification and ordination output files.

Raw output from the classifications can be found in the files *mon30sfa.out* (montane data) and *as33sf80.out* (alpine/subalpine data). Raw output from the ordinations can be found in the files *montane.out* (montane data) and *as.out* (alpine/subalpine data).

Appendix 3. Species by group summary tables.

Summary tables listing cover of all species for each group can be found in the files *as_group_spp_summary.xls* and *mon_group_spp_summary.xls*.

Appendix 4. Plot locations GIS file.

An ArcView shape file containing location and group data for all plots included in the analysis can be found in the directory *plot_utms_shapefile*. The database file associated with the shapefile contains UTM coordinates in NAD27 and NAD83 format for each plot.

Appendix 5. List of included files.

Files submitted with the report are in several different formats. "xls" files are Excel 2000 spreadsheets. "out" files are plain text output files. "wk1" are Lotus formatted spreadsheets. The following files were submitted with the report:

Group_ID.xls
mon30sfa.out
as33sf80.out
as_group_spp_summary.xls
mon_group_spp_summary.xls
montane.out
as.out

exss_allrecords_strata.xls
as-spp33.wk1
as-env.wk1
mon-sp10.wk1
mon-env.wk1
plot_utms_shapefile (directory)